Public Health Agency of Canada
Agence de santé publique du Canada

August 2006

August 2006

HIV/AIDS

Epi Updates

Canada

Mission

To promote and protect the health of Canadians through
leadership, partnership, innovation and action in public health.
Public Health Agency of Canada

This document is available:

By mail
Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture
Address locator: 0602B
Ottawa, ON K1A 0K9

Or from
Canadian HIV/AIDS Information Centre
Canadian Public Health Association
1565 Carling Avenue, Suite 400
Ottawa, Ontario, Canada, K1Z 8R1
Tel.: (613) 725-3434, Fax: (613) 725-1205
Toll Free: 1-877-999-7740
E-mail: aidssida@cpha.ca

By Internet *HIV/AIDS Epi Update*s can be assessed electronically in either official language via the Internet at http://www.phac-aspc.gc.ca/publicat/epiu-aepi/epi-06/index.html.

© Her Majesty the Queen in Right of Canada, represented by the Minister of Health (2006)
Cat. HP37-7/2006E
ISBN 0-662-43982-1
(On-line) Cat. HP37-7/2006E-PDF
ISBN 0-662-43983-X

HIV/AIDS
Epi Updates
Centre for Infectious Disease Prevention and Control

Acknowledgements

National level HIV and AIDS surveillance is possible as a result of all provinces and territories participating in, and setting directions for, HIV and AIDS surveillance. Accordingly, the Centre for Infectious Disease Prevention and Control acknowledges the provincial/territorial HIV/AIDS coordinators, public health units, laboratories, health care providers and reporting physicians for providing the non-nominal confidential data that enable this report to be published. Without their close collaboration and participation in HIV and AIDS surveillance, the publication of this report would not have been possible. We are thankful to the researchers across Canada who share their research findings with us in a timely manner for inclusion in the Epi Updates.

We also thank Web Site and Intranet Operations, Public Health Agency of Canada, for its contribution in producing the report on the Internet.

We also thank the contribution made by Marion Pogson, Pamela A. Fitch, and Robert Friedman in editing, translating and developing layouts of the report.

N.B. This document must be cited as the source of any information extracted and used from it.

Suggested citation: Public Health Agency of Canada. *HIV/AIDS Epi Updates, August 2006*, Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, 2006

HIV/AIDS
Epi Updates
Centre for Infectious Disease Prevention and Control

Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture, AL 0602B
Ottawa, Ontario, K1A 0K9

Telephone: (613) 954-5169
Fax: (613) 957-2842

Information to the readers of *HIV/AIDS Epi Updates*

The Surveillance and Risk Assessment Division of the Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, is pleased to provide you with the August 2006 publication of *HIV/AIDS Epi Updates*.

The Centre conducts national surveillance and research on the epidemiology and laboratory science related to HIV/AIDS and other sexually transmitted diseases. As part of this mandate, *HIV/AIDS Epi Updates* are compiled on an annual basis to summarize recent trends and developments related to the HIV epidemic in Canada.

All *Epi Updates* are available at the address noted above and also at our website: http://www.phac-aspc.gc.ca/publicat/epiu-aepi/epi-06/index.html. The *HIV/AIDS Epi Updates* are complementary to other Centre materials which are also available at the website.

Sincerely,

Chris Archibald MDCM, MHSc, FRCPC
Director

Centre for Infectious Disease Prevention and Control

Surveillance and Risk Assessment Division	**Tel.: (613) 954-5169** **Fax: (613) 957-2842**

Division personnel who contribute to the production of the *Epi Updates* are noted below:

Director	Dr. Chris Archibald, MDCM, MHSc, FRCPC
Executive Assistant	Moheenee Soondrum

HIV/AIDS Surveillance Section

Acting Manager	Jennifer Pennock, MSc, BSc
Senior Surveillance Analyst	Julie Stokes,BSc
Research Analyst	Chris Sheardown, BA
Surveillance Officer	Bruce Tudin, MA, BES
Surveillance Analyst	Stéphane Racette

HIV/AIDS Epidemiology Section

HIV/AIDS Epidemiologist	Dr. Yogesh Choudhri, MD, MPH
Senior Epidemiologist	David Boulos, MSc, BSc, BA
HIV/AIDS Epidemiologist	Dana Paquette, MSc
Surveillance Officer	Stephen Cule, BSc
Surveillance Analyst	Mark Vanderkloot, BA
Research Assistant	Farrah Ali, BA

HIV Drug Resistance and Field Surveillance Section

Manager	Dr. Gayatri Jayaraman, PhD, MPH
Senior Field Surveillance Officer	Dr. Tig Shafto, PhD
Research Analyst	Neil Goedhuis, BSc
Field Surveillance Officer	Dr. Sabrina Plitt, PhD
Field Surveillance Officer	Michelyn Wood, MS, BS
Field Surveillance Officer	Elsie Wong, MBA, BSN
Field Surveillance Officer	Lena Shah, BA, BSc
Field Surveillance Officer	Erin Laing, BSc
Field Surveillance Officer	Tracey MacDonald, BN, MN, CMHN
Field Surveillance Officer	Souradet Y. Shaw, BA.

Public Health Agency of Canada / Agence de santé publique du Canada

Canada

HIV/AIDS
Epi Updates
Centre for Infectious Disease Prevention and Control

Table of Contents

1 National HIV Prevalence and Incidence Estimates for 2005 1

2 Prevalent HIV Infections in Canada: More Than a Quarter May Not Be Diagnosed 9

3 HIV Testing and Infection Reporting in Canada 13

4 HIV and AIDS Among Youth in Canada 19

5 HIV and AIDS Among Women in Canada 27

6 HIV/AIDS Among Older Canadians 33

7 Perinatal Transmission of HIV 41

8 HIV/AIDS Among Aboriginal Peoples in Canada: A Continuing Concern 49

9 HIV Infections Among MSM in Canada 63

10 HIV/AIDS Among Injecting Drug Users in Canada 75

11 Risk Behaviours Among Injecting Drug Users in Canada 85

12 HIV in Canada Among Persons from Countries where HIV is Endemic 95

13 HIV-1 Strain Surveillance in Canada 111

14 Primary HIV Antiretroviral Drug Resistance in Canada 115

Glossary 125

Public Health Agency of Canada
Agence de santé publique du Canada

Canada

1

HIV/AIDS
Epi Update
Centre for Infectious Disease Prevention and Control

National HIV Prevalence and Incidence Estimates for 2005

At a Glance

- **More Canadians are living with HIV infection: an estimated 58,000 at the end of 2005 compared with 50,000 at the end of 2002.**
- **An estimated 2,300 to 4,500 new HIV infections occurred in 2005 compared with 2,100 to 4,000 in 2002.**

CIDPC Website:

www.phac-aspc.gc.ca/hast-vsmt/

Introduction

This *Epi Update* outlines the estimates of the total number of Canadians who were living with HIV infection at the end of 2005 (prevalence) and the number of new HIV infections in 2005 (incidence). Estimates published in this report for the years before 2005 replace all previous estimates that we have published concerning HIV prevalence and incidence in Canada because new data and methods have permitted an improved analysis of the epidemic and more reliable estimates. National estimates of HIV prevalence and incidence are an integral part of the work carried out by the Centre for Infectious Disease Prevention and Control. They are used as a tool to monitor the HIV epidemic and to help evaluate and guide prevention efforts, and they are part of ongoing risk assessment and management work conducted by the Centre. These estimates inform the work that the Public Health Agency of Canada and other federal departments perform under the *Federal Initiative to Address HIV/AIDS in Canada* and will also be used to guide the activities of all stakeholders in their common efforts to support *Leading Together: Canada Takes Action on HIV/AIDS.*

Methods

Methods to estimate prevalence and incidence at the national level are complex and contain a level of uncertainty.

We used multiple methods to estimate national HIV prevalence and incidence in 2005, including the workbook method,[1] an iterative spreadsheet model,[2] and two statistical modelling methods.[3,4] The workbook method multiplies an estimated prevalence or incidence rate by an estimated population size, the statistical models back-calculate estimates of HIV incidence by relating the timing of HIV positive testing with the timing of HIV infection and testing behaviour, and the iterative spreadsheet model incorporates elements of the other two methods.

The methods were used to generate separate estimates of HIV prevalence and incidence in Ontario, Quebec, British Columbia, and Alberta. These provinces together account for over 85% of the population of Canada and over 95% of reported HIV and AIDS diagnoses. Estimates were further subclassified according to the following exposure categories: men who have had sex with men (MSM), injecting drug users (IDU), MSM-IDU, heterosexual/endemic (non-IDU heterosexual with origin in a country where heterosexual sex is the predominant mode of HIV transmission and HIV prevalence is high, primarily countries in sub-Saharan Africa and the Caribbean),[5,6] heterosexual/non-endemic (heterosexual contact with a person who is either HIV-infected or at risk of HIV, or heterosexual as the only identified risk), and other (recipients of blood transfusion or clotting factor, perinatal and occupational transmission).

For some exposure category and province combinations, the modelling methods were not able to produce estimates, and in these cases surveillance data were used to partition out the most likely distribution of the provincial estimates among exposure categories. The results of the different methods were averaged to obtain exposure category-specific prevalence and incidence estimates for each of the four provinces.

HIV prevalence and incidence estimates for the remainder of Canada were extrapolated from these four provinces using national HIV surveillance data. The national surveillance data were obtained from the national HIV and AIDS surveillance reporting system[5,6] with enhancements from two sources: the Laboratory Enhancement Study in Ontario,[7] which has more complete information on exposure category of HIV cases, and recently published[8] and unpublished surveillance data from Quebec on exposure category breakdown of cases newly diagnosed with HIV during 2002 to 2005.

National estimates of HIV prevalence and incidence for the years before 2005 were obtained using results from modelling to describe the past distributions of HIV prevalence and incidence relative to the 2005 estimate. Bounds of uncertainty for the national HIV estimates were developed on the basis of a conservative consideration of results from a variety of scenarios.

Estimates of HIV prevalence and incidence among women and Aboriginal persons were derived from the overall estimates obtained from the distributions of reported gender and Aboriginal status by exposure category in the national HIV and AIDS surveillance data.

Results

Prevalence Estimates

More people are living with HIV infection (prevalent infections). At the end of 2005, there were an estimated 58,000 (48,000-68,000) people in Canada living with HIV infection (including AIDS), which represents an increase of about 16% from the point estimate of 50,000 at the end of 2002 (Table 1). In terms of exposure category, these prevalent infections in 2005 comprised 29,600 MSM (51% of total), 9,860 IDU (17% of total), 8,620 heterosexual/non-endemic (15% of total), 7,050 heterosexual/endemic (12% of total), 2,250 MSM-IDU (4% of total), and 400 attributed to other exposures (< 1% of total) (Table 1).

HIV prevalence: past trends

Prevalent infections (Figure 1) rose steadily during the 1980s, corresponding to the initial rise in HIV infection in the Canadian population, mainly among MSM. This rise reached a plateau in the early to mid-1990s, likely as a result of both increased mortality and effective prevention programs. Prevalent infections began to rise again in the late 1990's due to new treatments improving survival of

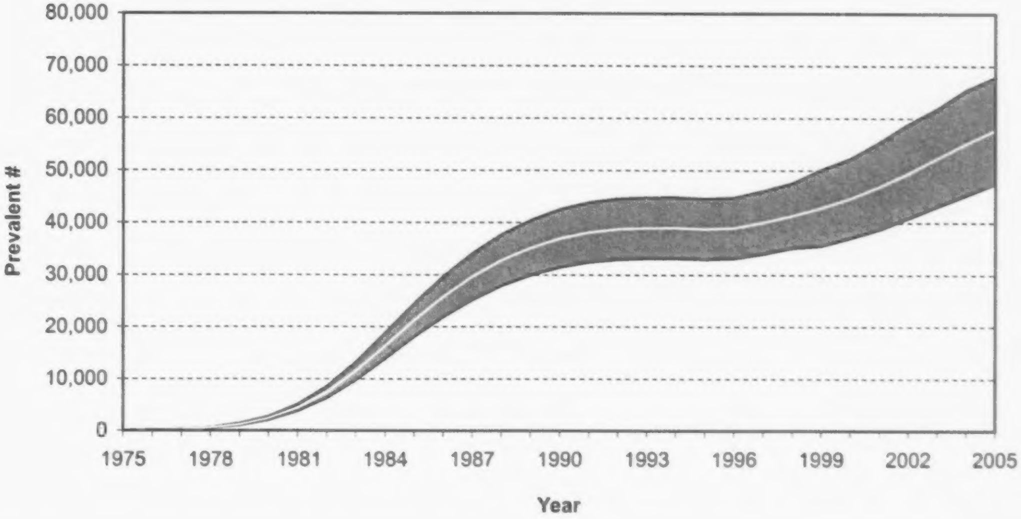
Table 1. Estimated number of prevalent HIV infections in Canada and associated ranges of uncertainty at the end of 2005 and 2002 (point estimates and ranges are rounded)

	MSM	MSM-IDU	IDU	Heterosexual/ non-endemic	Heterosexual/ endemic	Other	Total*
2005	29,600 (24,000-35,000)	2,250 (1,500-3,000)	9,860 (7,800-12,000)	8,620 (6,600-10,600)	7,050 (5,200-8,800)	400 (300-500)	58,000 (48,000-68,000)
2002	26,200 (21,000-31,000)	1,900 (1,200-2,600)	8,900 (7,200-10,600)	6,950 (5,200-8,800)	5,680 (4,000-7,300)	350 (250-450)	50,000 (41,000-59,000)

MSM: men who have sex with men; IDU: injecting drug users; Heterosexual/non-endemic: heterosexual contact with a person who is either HIV-infected or at risk of HIV, or heterosexual as the only identified risk; Heterosexual/endemic: origin in a country where HIV is endemic; Other: recipients of blood transfusion or clotting factor, perinatal and occupational transmission

* Totals were rounded to the nearest 1,000. Unrounded totals were 57,780 for 2005 and 49,980 for 2002, which were used to compute percentages.

Figure 1. Estimated number of prevalent HIV infections in Canada, including range of uncertainty, by year



HIV-infected individuals combined with continuing new infections.

Incidence Estimates

The number of new HIV infections in Canada in 2005 has not decreased and may have increased slightly compared with 2002. An estimated 2,300 to 4,500 new HIV infections occurred in 2005 as compared with 2,100 to 4,000 in 2002 (Table 2). Examining the estimates by exposure category, MSM continues to account for the greatest number of new infections, 1,100 to 2,000 (45%) as compared with 900 to 1,700 (42%) in 2002 (Table 2). The number of new infections estimated among IDU has decreased from a range of 400 to 700 (19%) in 2002 to 350 to 650 (14%) in 2005. For the heterosexual/non-endemic exposure category, the range

Table 2. Estimated ranges of uncertainty for number of incident HIV infections in Canada in 2005 and 2002 (ranges are rounded)

	MSM	MSM-IDU	IDU	Heterosexual/ non-endemic	Heterosexual/ endemic	Other*	Total
2005	1,100-2,000	70-150	350-650	550-950	400-700	< 20	2,300-4,500
2002	900-1,700	60-120	400-700	450-850	300-600	< 20	2,100-4,000

MSM: men who have sex with men; IDU: injecting drug users; Heterosexual/non-endemic: heterosexual contact with a person who is either HIV-infected or at risk of HIV, or heterosexual as the only identified risk; Heterosexual/endemic: origin in a country where HIV is endemic; Other: recipients of blood transfusion or clotting factor, perinatal and occupational transmission

* New infections in the Other category are very few and are primarily due to perinatal transmission.

increased from 450 to 850 (21%) in 2002 to 550 to 950 (21%) in 2005.

Persons from HIV-endemic countries continue to be over-represented in Canada's HIV epidemic. New infections attributed to the heterosexual/endemic exposure category increased slightly from a range of 300 to 600 (15%) in 2002 to 400 to 700 (16%) in 2005, yet according to the 2001 Census approximately 1.5% of the Canadian population were born in an HIV-endemic country.[9] Therefore, the estimated infection rate among individuals from HIV-endemic countries is at least 12.6 times higher than among other Canadians. With the current methods and available data, it is not possible to differentiate infections acquired abroad from those acquired in Canada. CIDPC is currently collaborating with other government departments, provincial/territorial partners, researchers, and community groups to develop methods and obtain data to better understand the current status and trends of HIV infection in this group.

HIV incidence: past trends

The distribution of new HIV infections by exposure category has changed since the beginning of the HIV epidemic in Canada (Figure 2). The proportion of MSM among new infections steadily declined until 1996 and has increased since then, whereas there was a steady increase in the proportion of IDU among new infections until 1996 and then a decrease. The proportions of new infections attributed to the heterosexual/endemic and non-endemic exposure categories have increased steadily since the beginning of the epidemic.

Figure 3 presents the uncertainty range for estimated HIV incidence over time. New infections peaked during 1984-1985, and this was associated primarily with the MSM population (Figure 2). The number of incident infections decreased steadily after 1985 until the early 1990s and was followed by a slight secondary peak during 1996 and 1997, which was associated with high infection rates in the IDU population (Figure 2). Incident infections may have increased somewhat since the late 1990s, but there is a great deal of uncertainty associated with recent incidence estimates and, if present, this increase is much less than that seen in the early 1980s. At any rate, it can be stated with more certainty that the recent trend in incidence does not appear to be decreasing.

In national HIV surveillance data, new positive HIV test reports increased from the year 2001 to 2002 and then changed very little over the period from 2002 to 2005.[5,6] New diagnoses reported to CIDPC were 2,178 in 2001, 2,494 in 2002, 2,497 in 2003, 2,535 in 2004, and 2,483 in 2005. Some, but likely not all, of this increase between 2001 and subsequent years was due to the new HIV testing policy for immigrants and refugees implemented by Citizenship and Immigration Canada[10] on 15 January, 2002.

Figure 2. Estimated exposure category distributions (%) of new HIV infections in Canada, by time period

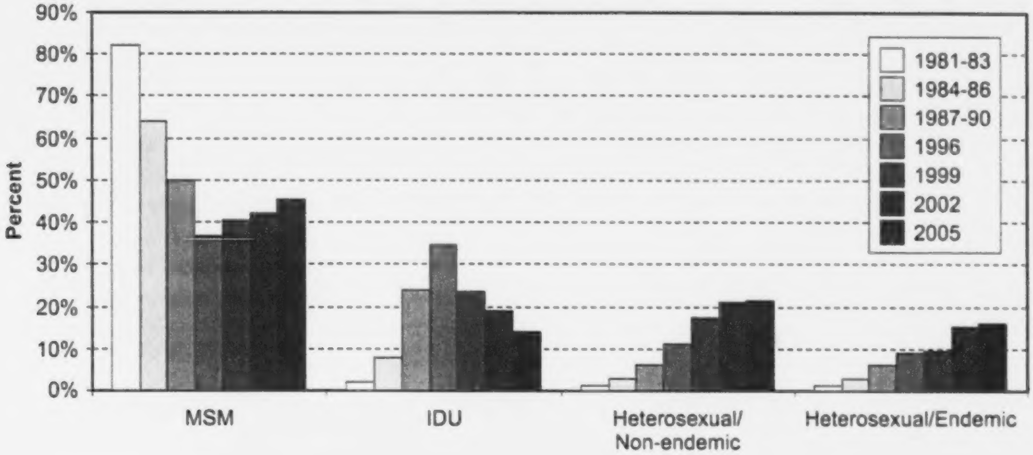
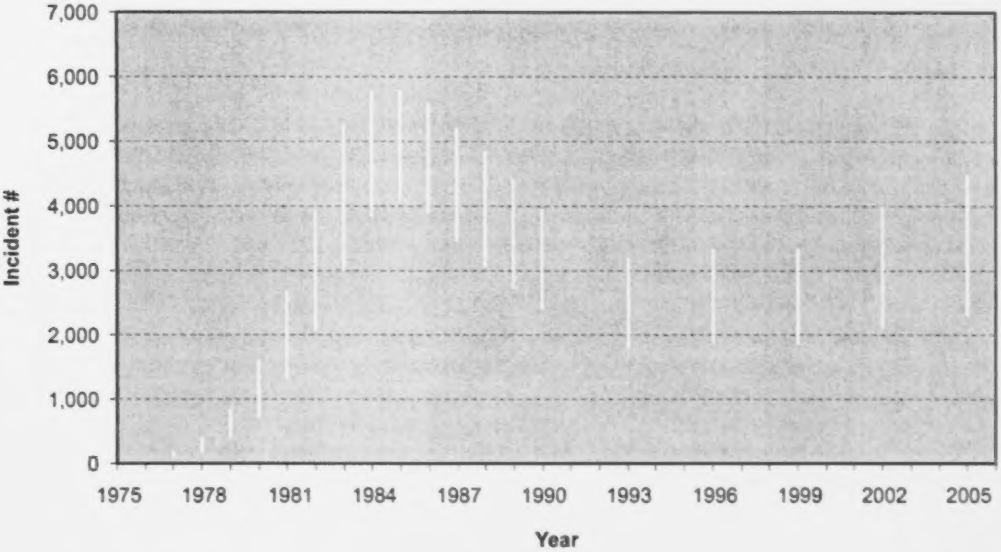


Figure 3. Estimated range of uncertainty (represented by vertical bars) in the number of new HIV infections in Canada, for selected years of infection



Trends among Women

At the end of 2005, there were an estimated 11,800 (10,000 to 13,500) women living with HIV (including AIDS) in Canada, accounting for about 20% of the national total. This represents a 23% increase from the 9,600 estimated for 2002. There were 620 to 1,240 new HIV infections among women in 2005, representing 27% of all new infections. For 2002, it was estimated that 490 to 970 new HIV infections were among women, accounting for about 24% of all new infections. With respect to exposure category, a slightly higher proportion of new infections among women were attributed to the heterosexual category in 2005 than in 2002 (76% versus 74%, respectively). The remainder of new infections among women were attributed to IDU.

Trends Among Aboriginal Persons

Aboriginal persons continue to be over-represented in the HIV epidemic in Canada. They make up 3.3% of the Canadian population,[11] and yet an estimated 3,600 to 5,100 Aboriginal persons were living with HIV in Canada in 2005, representing about 7.5% of all prevalent HIV infections. This is higher than the estimated 3,100 to 4,400 for 2002 but represents the same proportion (7.5%). Approximately 200 to 400 of the new HIV infections in 2002 and 2005, respectively, occurred in Aboriginal persons, which is about 10% of the total for 2002 and 9% for 2005. Therefore, the overall infection rate among Aboriginal persons is about 2.8 times higher than among non-Aboriginal persons. The distribution of exposure category among newly infected Aboriginal persons in 2005 was 53% IDU, 33% heterosexual, 10% MSM, and 3% MSM-IDU, which is unchanged from 2002.

The proportion of new HIV infections in 2005 due to IDU among Aboriginal Canadians (53%) is much higher than among all Canadians (14%). This highlights the uniqueness of the HIV epidemic among Aboriginal persons and underscores the complexity of Canada's HIV epidemic.

Undiagnosed HIV Infections: the Hidden Epidemic

There have been 60,160 positive HIV tests reported to CIDPC since testing began in November 1985 up to 31 December, 2005, which translates into about 62,800 after adjustment for underreporting and duplicates. Of these, we further estimate that approximately 20,800 have died. Thus, 42,000 Canadians living with HIV infection in 2005 have been diagnosed. By subtracting this number from the estimated number of prevalent infections in 2005 (58,000 or 57,800 before rounding), we estimate that about 15,800 people (11,500 to 19,500) or 27% were unaware of their HIV infection. This compares with an estimated 14,400 (10,700 to 17,900) or 29% who were living and unaware of their HIV infection in 2002. The size of this group is especially difficult to estimate because its members are "hidden" to the health care and disease monitoring systems. It is important to reach this group since undiagnosed individuals cannot take advantage of available treatment strategies or appropriate counselling to prevent the further spread of HIV. Currently, it is not possible to further define this "hidden" group by exposure category or gender, but CIDPC is working to address this issue. For example, among AIDS cases in Canada, persons with a late HIV diagnosis are more likely to belong to a non-White ethnic group and to have been infected by routes other than MSM or IDU (such as by heterosexual activity).[12] Such information can assist in targeting programs to increase awareness of the risk of HIV transmission and improve access to and use of HIV testing.

Limitations

The 2005 estimates differ from previous years in that more emphasis has been placed on a combination of methods. However, the amount of data available was not always sufficient for the modelling to estimate exposure category-specific numbers for all provinces; in these cases, HIV and AIDS surveillance data were used to extrapolate the additional numbers. The workbook method was heavily dependent on the representativeness of available data and on the assumptions made for groups when recent data were lacking.

Estimates for the Aboriginal subpopulation relied on ethnic variables in the HIV and AIDS surveillance data that are not completely reported at the national level. Information on risk factors in surveillance data was also incomplete, and this may have led to the misclassification of some cases. Furthermore, insufficient information was available to distinguish infections acquired outside Canada from those acquired within. Therefore, incidence as used in this report refers to a new infection appearing in Canada, either through transmission within Canada or the arrival of an HIV-positive individual. CIDPC is currently working with its partners to obtain data that would allow for the separate modelling of domestically acquired infections and the subsequent addition of newly arrived infections to the estimates.

These national estimates do not necessarily reflect local trends in HIV prevalence and incidence, neither do they address all populations affected by the HIV/AIDS epidemic in Canada (for example, prisoners), and the estimates are not broken down by age.

Comments

The methods used to estimate HIV prevalence and incidence made use of a wide variety of data. Additional sources of surveillance data were available from Ontario and Quebec that provided greater clarity to the characteristics of the epidemic in these provinces. Statistical modelling methods were used for the first time, making optimal use of the national HIV surveillance data. For future estimates, we plan to make increased use of tests to identify recent infections among diagnosed cases and to incorporate more results from targeted studies among high-risk populations. Despite the limitations noted, we believe this is a plausible picture of the state of the epidemic in Canada.

Approximately 58,000 Canadians were estimated to be living with HIV infection. This number will likely increase as new infections continue and survival improves due to new treatments, which will mean increased future care requirements. An estimated 2,300 to 4,500 new infections occurred in Canada in 2005, slightly higher than was estimated for 2002. However, the increase cannot be stated with certainty because of the level of precision associated with the estimates; a firmer conclusion is that overall incidence is not decreasing. This trend applies to the MSM, MSM-IDU, and both heterosexual exposure categories, but incidence for the IDU exposure category appears to be decreasing.

To successfully control the HIV epidemic in Canada, there is a need to ensure that effective strategies are in place to prevent new infections and provide services for all of the vulnerable populations identified in the Federal Initiative to Address HIV/AIDS in Canada. In addition, there is an increasing need to improve the availability and quality of data to better understand and monitor the full scope of the HIV epidemic in Canada.

References

1. Lyerta R, Gouws E, Garcia-Calleja JM et al. *The 2005 workbook: an improved tool for estimating HIV prevalence in countries with low level and concentrated epidemics*. Sex Transm Infect 2006;82:41-4.
2. Remis RS, Swantee C, Schiedel L et al. *Report on HIV/AIDS in Ontario 2004*. Toronto: Ontario Ministry of Health and Long-Term Care, February 2006.
3. Yan P, Remis RS, Archibald CP et al. *Modeling HIV infection in Ontario: a comparison of two methods*. XVI International AIDS Conference, Toronto, August 2006.
4. Schanzer D. *New disease model estimates of the second wave in HIV incidence, Canada: a call for renewed HIV prevention*. Congress of Epidemiology, Seattle, June 2006.
5. Health Canada. *HIV and AIDS in Canada. Surveillance report to December 31, 2005*. Ottawa: Division of HIV/AIDS Epidemiology and Surveillance, Centre for Infectious Disease Prevention and Control, Health Canada, April 2006.
6. Health Canada. *HIV and AIDS in Canada. Surveillance report to June 30, 2005*. Ottawa: Division of HIV/AIDS Epidemiology and Surveillance, Centre for Infectious Disease Prevention and Control, Health Canada, November 2005.
7. Remis RS, Swantee C, Fearon M et al. *Enhancing diagnostic data for HIV surveillance: the Ontario Laboratory Enhancement Study (LES)*. Can J Infect Dis 2004;5(Suppl A):61A(Abstract 342P).
8. Ministère de la Santé et des Services Sociaux. *Surveillance de l'infection par le virus de l'immunodéficience humaine (VIH) au Québec cas cumulatifs 2002-2004*. Montréal: Direction générale de la santé publique, Mise à jour no 2004-1, au 30 juin 2004.

9. Statistics Canada. *Immigrant status and period of immigration (10A) and place of birth of respondent (260) for immigrants and non-permanent residents for Canada, provinces, territories, Census Metropolitan Areas and Census Agglomerations, 20% Sample Data*. Ottawa: Statistics Canada. Cat 97F0009XCB 01002, Census 2001.

10. Citizenship and Immigration Canada. Fact Sheet 20. *Medical testing and surveillance*. URL: <http://www.cic.gc.ca/english/irpa/fs%2Dmedical.html>.

11. Statistics Canada. *Aboriginal peoples of Canada: a demographic profile*. The Daily. January 2003. Catalogue no. 96F0030XIE 2001007.

12. Geduld J, Romaguera A, Esteve A et al. *Late diagnosis of HIV infection among reported AIDS cases in Canada and Catalonia, Spain*. XIV International Conference on AIDS, Barcelona, July 2002.

Acknowledgements

National level HIV and AIDS surveillance is possible as a result of all provinces and territories participating in, and setting directions for, HIV and AIDS surveillance. CIDPC acknowledges the provincial/territorial HIV/AIDS co-ordinators, public health units, laboratories, health care providers, and reporting physicians for sharing non-nominal, confidential data for national surveillance.

For more information, please contact:

Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture
Postal Locator: 0602B
Ottawa, ON K1A 0K9
Tel: (613) 954-5169
Fax: (613) 957-2842
www.phac-aspc.gc.ca

Mission

To promote and protect the health of Canadians through leadership, partnership, innovation and action in public health.

Public Health Agency of Canada

Public Health Agency of Canada
Agence de santé publique du Canada
Canada

HIV/AIDS

Epi Update

Centre for Infectious Disease Prevention and Control

Prevalent HIV Infections in Canada: More Than a Quarter May Not Be Diagnosed

At a Glance

- **There were an estimated 58,000 people living with HIV infection (including AIDS) in Canada at the end of 2005.**
- **Of these, approximately 15,800 or 27% are not aware of their infection.**
- **Given the new treatments for HIV, it is more important than ever that all Canadians are able to access HIV testing.**

CIDPC Website:

www.phac-aspc.gc.ca/hast-vsmt/

Introduction

This *Epi Update* presents the estimated number of Canadians who were HIV infected but unaware of their infection at the end of 2005. It also summarizes available data on the characteristics of persons tested for HIV in Canada.

HIV Testing in Canada

Knowledge of one's HIV status can be useful for several reasons. Counselling received at the time of HIV testing can provide critical information about how to reduce the risk of HIV infection. If an individual is found to be HIV infected, consideration can be given to starting antiretroviral therapy. In the case of pregnant women, treatment can reduce the chances that the infant will be infected, from 35%-40% to 2% or less.[1]

Canadians have had the opportunity to be tested for HIV infection in Canada since the test became available in 1985. Individuals have accessed HIV testing services through either coded or confidential testing at a doctor's office or clinic, or through anonymous testing sites.

Positive HIV test report data are provided by all provinces and territories in Canada to the Centre for Infectious Disease Prevention and Control (CIDPC) and are presented in the most recent semi-annual report: *HIV and AIDS in Canada: surveillance report to December 31, 2005.*[2] The reports are based on non-nominal, confidential HIV testing information, and duplicate tests for the same individual are removed as much as possible. The removal of duplicates is necessary to accurately reflect the annual number of new HIV diagnoses. Duplicate removal rates vary by year, province and type of data (nominal, non-nominal or anonymous), and in most provinces the ability to remove duplicates has improved significantly since 1995.

HIV-infected but Unaware

It is important to note that data on positive HIV tests represent only those who have tested positive for HIV infection and does not represent all persons who have been infected with HIV, as some who have been infected have not yet come forward for testing.

CIDPC has recently published estimates of HIV prevalence in Canada to the end of 2005[3] (also see first *Epi Update* in this series entitled National HIV Prevalence and Incidence Estimates for 2005). It was estimated that approximately 58,000 (48,000-68,000) Canadians were living with HIV infection (including those living with AIDS) at the end of 2005. This estimate of 58,000 is rounded to the nearest 1,000, but for the purposes of calculating the undiagnosed portion the estimate was rounded to the nearest 100 (i.e. 57,800). This number includes those who are aware of their infection (have had a positive HIV test) and those who are unaware of their infection.

There have been 60,160 positive HIV tests reported to CIDPC since testing began in November 1985 to December 31, 2005, which translates to about 62,800 after adjusting for underreporting and duplicates. Of these, we further estimate that approximately 20,800 have died. Thus, 42,000 Canadians living with HIV infection in 2005 have been given a diagnosis. The difference between the total number who were HIV infected and alive at the end of 2005 (57,800 when rounded to the nearest 100) and the number who were aware of their HIV infection and alive at the end of 2005 (42,000) represents an estimate of the number of persons unaware of their infection (not yet tested positive for HIV) and alive. This difference is 15,800 (11,500-19,500) or about 27% of the estimated number of Canadians living with HIV infection at the end of 2005. This compares with an estimated 14,400 (10,700-17,900) or 29% who were living and unaware of their HIV infection at the end of 2002.

Targeted studies provide a direct measure of the proportion of individuals whose HIV infection is undiagnosed in various subpopulations. In the most recent phase of the I-Track survey of injecting drug users conducted at selected centres across Canada (2003-2005), 22.9% reported that their HIV status was negative or unknown, whereas blood testing indicated that they were HIV positive (Surveillance and Risk Assessment Division, CIDPC, I-Track unpublished data, April 2006). A targeted study involving MSM in Montreal indicated that in 2005 of the men who tested positive for HIV 23% were unaware of their infection.[4] These targeted populations are likely more aware of their risks of infection and thus have higher rates of testing and lower proportions of undiagnosed infection than other subpopulations.

Characteristics of Persons Tested for HIV

A Canada-wide survey conducted in March 2003 of randomly selected individuals above 15 years of age revealed that just over one-quarter (27%) reported ever having been tested for HIV, excluding testing for the purposes of insurance, blood donation, and participation in research.[5] In this survey, women were more likely to have been tested than men (29% versus 24%), and of those who reported having been tested 42% had not been tested in the previous 2 years, 38% had been tested once in the previous 2 years, and 18% had been tested twice or more in the previous 2 years.

The figures from this 2003 survey show that a higher proportion of individuals reported having been tested as compared with the results of a Canada-wide survey conducted in January 1997, when it was found that 18.6% of men and 16.2% of women aged 15 years and older had been tested for HIV (excluding tests for blood donation and insurance purposes).[6,7] Of these, 39% had been tested in the year before the survey, 57% in the previous 2 years, and 43% had had their most recent test more than 2 years before the survey. The results of a 1996 survey showed that, taking into account ancillary testing such as for blood donation or life-insurance purposes, 41% of men and 31% of women in Canada had ever been tested for HIV.[8]

National surveys of the general population suggest that those who report risk factors are more likely to be tested:

- Among heterosexuals, those with two or more partners in the previous year were more likely to be tested than those with one partner (50.5% versus 17.4%). Of those who reported having had a sexually transmitted infection (STI) in the previous 5 years, 58% had been tested compared with 17.4% of those who did not report an STI.[6,7] The percentage of Canadians being tested is higher among individuals who report casual partners (45%); this percentage increases with the number of partners, from 30% among those reporting one partner to 41% among those reporting two partners and 51% among those reporting three partners.[5]
- For men, testing was higher among those who had sexual intercourse with men (71%), used injecting drugs (62%), received blood or clotting factor between 1978 and 1985 (27%), or had had a partner with a risk factor (injecting drug user [IDU], received blood or clotting factor between 1978 and 1985, origin in a country endemic for HIV) (30%).[6,7] For women, testing was higher among those who had received blood or clotting factor between 1978 and 1985 (32%), had had a high-risk partner (38%), or had had sexual intercourse with a man since 1978 (17%).[8]
- Testing was highest among individuals aged 25 to 34 years. Even after all other risk factors are taken into account, those aged 45 years and over were still less likely to be tested than those younger than 45 years.[6-8] In the survey conducted in March 2003, Canadians aged 25-34 years and 35-44 years were more likely to be tested (46% and 35% respectively).[5]
- Targeted studies have shown that a large proportion of individuals in high-risk populations have been tested for HIV, though it is possible that some were tested for the purpose of participation in research. Among men who have sex with men (MSM) surveyed in B.C. in 2002, the proportion who reported ever having been tested was 89%.[9] This is higher than both the 65% of MSM respondents in a national study in 1991 who indicated that they had been tested for HIV[10] and the 78% of MSM who responded similarly in the Ontario Men's Survey in Ontario in 2002.[11] In the Ontario Men's Survey, a majority of respondents indicated that they had never been tested for HIV because they considered themselves to be at low risk of infection. In the I-Track survey of IDUs conducted at selected centres across Canada in 2002-03, 89.7% of IDU reported having been tested for HIV.[12]
- Although those reporting risk factors such as IDU, multiple partners, or MSM are more likely to be tested, a substantial proportion of those reporting risk factors have not been tested recently or have not been tested at all. For example, in the 1997 survey, among those who reported having had more than one partner in the previous year and not having used condoms consistently, 53% of men and 38% of women had never been tested.[5,6]

Comment

Canadians with risk factors for HIV infection are more likely to have been tested for HIV than those without such risk factors. However, there is still a significant proportion of persons with risk factors who have never been tested for HIV. It has been estimated that approximately 15,800 people or 27% of the HIV-infected population are unaware that they are infected. More information is needed about individuals who are at risk of HIV but have not been tested. Given these data and the fact that new treatments are available for HIV infection, it is more important than ever that all Canadians, particularly those at highest risk of infection, be able to access HIV testing.

References

1. Newall M. *Current issues in the prevention of mother to child transmission of HIV-1 infection*. Trans R Soc Trop Med Hyg 2006;100(1):1-5.
2. Health Canada. *HIV and AIDS in Canada: surveillance report to December 31, 2005*. Ottawa: Division of HIV/AIDS Epidemiology and Surveillance, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, April 2006.
3. Boulos D, Yan P, Schanzer D, Remis RS and Archibald C. Estimates of HIV prevalence and incidence in Canada, 2005. *Can Commun Dis Rep* 2006; 32(15):165-174.
4. Lambert G, Cox J, Tremblay F et al. *Recent HIV testing behaviour among men having sex with man (MSM) in Montreal: results from the Argus 2005 survey*. Can J Infect Dis Med Microbiol 2006;17(Suppl A):45A, #313.
5. Choudhri Y, Cule S. *Factors associated with testing for HIV among females and males in Canada*. Can J Infect Dis Med Microbiol 2006;17(Suppl A):42A, #304.
6. Houston SM, Archibald CP, Sutherland D. *Sexual risk behaviours are associated with HIV testing in the Canadian general population*. Can J Infect Dis 1998;9(Suppl A):39A, #239P.
7. *Canada Health Monitor Survey*. Ottawa: Division of HIV Epidemiology, Centre for Disease Prevention and Control, Health Canada, January 1997 (unpublished data).
8. Houston SM, Archibald CP, Strike C et al. *Factors associated with HIV testing among Canadians: results of a population-based survey*. Int J STD AIDS 1998;9:341-46.
9. Trussler T, Marchand R, Barker A. *Sex NOW by the numbers: a statistical guide to health planning for gay men*. Vancouver, BC: Community-Based Research Centre, 2004: 44. URL: <www.sexnowsurvey.com>.
10. Myers T, Godin G, Calzavara L et al. *The Canadian Survey of Gay and Bisexual Men and HIV Infection: men's survey*. Ottawa: Canadian AIDS Society and National AIDS Clearing House (catalogue ISBN 0-921906-14-5), 1993.
11. Myers T, Allman D, Calzavara L et al. *The Ontario Men's Survey: final report*. 2004. URL: <http://www.mens-survey.ca/doc/OMS_Report_web_final%20.pdf>.
12. Health Canada. *I-Track: enhanced surveillance of risk behaviours among injecting drug users in Canada. Pilot survey report. February 2004*. Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Health Canada, 2004.

Acknowledgements

National level HIV and AIDS surveillance is possible as a result of all provinces and territories participating in, and setting directions for, HIV and AIDS surveillance. CIDPC acknowledges the provincial/territorial HIV/AIDS coordinators, public health units, laboratories, health care providers, and reporting physicians for sharing non-nominal, confidential data for national surveillance.

For more information, please contact:

Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture
Postal locator: 0602B
Ottawa, ON K1A 0K9
Tel: (613) 954-5169
Fax: (613) 957-2842
www.phac-aspc.gc.ca

Mission

To promote and protect the health of Canadians through leadership, partnership, innovation and action in public health.

Public Health Agency of Canada

HIV/AIDS
Epi Update
Centre for Infectious Disease Prevention and Control

HIV Testing and Infection Reporting in Canada

At a Glance

- **Nominal, non-nominal, and anonymous HIV testing are available in Canada.**
- **Although anonymous testing may encourage testing, it is not available in all provinces and territories.**
- **HIV infection is notifiable in all provinces and territories as of May 1, 2003.**

CIDPC Website:

www.phac-aspc.gc.ca/hast-vsmt/

Introduction

There were 20,353 AIDS cases reported to the Centre for Infectious Disease Prevention and Control (CIDPC) between 1979 and December 31, 2005, and 60,160 positive HIV tests reported between 1985 and the end of December 2005.[1] The positive HIV test results reported to CIDPC are from people who test positive for HIV through nominal, non-nominal, or anonymous testing in the provinces and territories and whose results are reported to CIDPC by their respective health authority or HIV testing laboratory.

This *Epi Update* summarizes the most current information on the reporting of HIV infection in Canada, including the types of HIV testing available and when HIV infection reporting became notifiable in each province and territory. A notifiable disease is one that is considered to be of such importance to public health that its occurrence is required to be reported to public health authorities. (The terms notifiable and reportable are used interchangeably when discussing HIV/AIDS reporting in Canada.)

HIV Infection is Notifiable Across Canada

As of May 1, 2003, HIV infection became legally notifiable in all provinces and territories; therefore now both positive HIV test reports and AIDS diagnoses are notifiable in all jurisdictions across Canada.

In most testing situations, laboratories and physicians are responsible for reporting HIV infection, but this varies by province or territory.

When HIV infection is notifiable, "nominal/name-based" or "non-nominal/non-identifying" information about an individual who tests positive for HIV infection is forwarded to provincial or territorial public health officials. This includes demographic data, such as the person's age and gender; risks associated with the transmission of HIV; and laboratory data, such as the date of the person's first positive HIV test.

HIV infection is not legally notifiable at the national level, yet notification to CIDPC is voluntarily undertaken by all provinces and territories. Positive HIV test reports and reported AIDS cases are provided non-nominally to CIDPC.

HIV testing patterns within the general population, along with the profile of people being tested, are important for designing and targeting intervention programs[2] and for developing a context for HIV/AIDS surveillance data. In 2003, a general population survey of 2,004 Canadians aged 15 years and older showed that 29% of women and 24% of men had ever been tested for HIV.[3]

Three Types of HIV Testing Available in Canada

Canadians choosing to be tested for the presence of HIV infection may have three different testing options, depending on the province or territory in which testing takes place: **nominal**, **non-nominal**, or **anonymous**.

Nominal/Name-Based HIV Testing

- May be carried out at numerous locations, including clinics and the office of a health care provider.
- The person ordering the test knows the identity* of the person being tested for HIV.
- The HIV test is ordered using the name of the person being tested.
- There is a collection of patient information such as age, gender, city of residence, name of diagnosing health care provider, country of birth, ethnicity, information detailing the HIV-related risk factors of the person being tested, and laboratory data. The amount of information collected varies according to the province/territory.
- If the HIV test result is positive, the person ordering the test is obligated by law to notify public health officials of the positive test result.
- The test result is recorded in the health care record of the person being tested.

Non-nominal/Non-identifying HIV Testing

- Similar to nominal/name-based testing with one exception: the HIV test is ordered using a code or the initials of the person being tested (not including the full or partial name).

Anonymous Testing

- Usually available at specialized clinics, organized and supported by public health departments and by some health care providers.
- The person ordering the HIV test does not know the identity of the person being tested for HIV.
- The HIV test is carried out using a code. The person ordering the HIV test and the laboratory carrying out the testing on the blood sample do not know to whom the code belongs. Only the person being tested for HIV knows the unique, non-identifying code.
- Information such as age, gender, HIV-related risk factors, and the ethnicity of the person being tested for HIV may be collected during anonymous testing, depending on the province or territory in which the test is ordered or on the test site.
- Test results are not recorded on the health care record of the person being tested. It is only the person being tested who may subsequently decide to give his or her name and include the HIV test result in the medical record.

---

* In rare instances, the true identity of the person being tested for HIV may not be known.

Table 1. HIV testing and HIV reporting by province/territory

Province/ territory	Type of HIV testing available	Year in which HIV infection became notifiable	Responsibility for reporting of HIV infection	Type of testing reported to the province/ territory
British Columbia	N, NN*	2003	L, P, RN**	N, NN
Yukon	N, NN	1995	P	N
Northwest Territories	N, NN	1988	L, P, RN	N
Nunavut	N, NN	1999	L, P, RN	N
Alberta	N, NN, A	1998	L, P	N
Saskatchewan	N, NN, A	1988	L, P	NN
Manitoba	NN	1985	L, P	NN
Ontario	N, NN, A	1985	L, P	N, NN†
Quebec	N, NN, A	2002	L, P	NN
New Brunswick	N, NN, A	1985	L, P, RN	NN
Nova Scotia	N, NN, A	1985	L, P	N, NN
Prince Edward Island	N, NN	1988	L, P, RN	N, NN
Newfoundland and Labrador	N, NN, A‡	1987	L, P	N

N = nominal/name-based
A = anonymous
P = physician
NN = non-nominal/non-identifying
L = laboratory
RN = nurse

*In BC, follow-up and reporting for non-nominal tests is the same as for nominal tests. If a patient tests non-nominally, they remain part of the non-nominal system.

**In BC, all positive cases are reported to HIV Surveillance/British Columbia Centre for Disease Control, which then reports the first positive cases to designated nurses in the health service delivery area (HSDA) where the test was ordered.

†In Ontario, data from positive HIV tests completed by means of anonymous HIV testing (AHT) are reported non-nominally at the provincial level.

‡If someone tests positive for HIV through AHT, that individual then becomes part of the nominal/name-based system, in which counselling, follow-up care, and HIV data reporting are all done nominally.

The types of HIV testing services available and HIV infection reporting information across Canada are summarized in Table 1.

Availability of Anonymous HIV Testing (AHT) May Increase Testing

Information regarding the status of anonymous HIV testing in Canada is summarized in Table 2.

As anonymous testing offers the highest degree of confidentiality, it may encourage more people to come forward for HIV testing and counselling.[4]

An evaluation study of AHT in Ontario suggested that AHT provides testing to populations that are not otherwise accessing it.[5]

In Ontario, more than 10,000 HIV tests were performed anonymously in 2004. This represents 2.8% of all HIV tests done that year.[6]

As of March 1995, Quebec reported that 3.6% of the samples analyzed by their laboratory were anonymous. In 1997-98, this figure rose to 3.9%. Between 1994 and

Table 2. Status of anonymous HIV testing (AHT) by province/territory

Province/territory	Year in which AHT became available	Number of AHT sites	AHT data reported to CIDPC	Counselling services available
British Columbia	—	—	—	—
Yukon	—	—	—	—
Northwest Territories	—	—	—	—
Nunavut	—	—	—	—
Alberta	1992	3	Yes	Yes
Saskatchewan	1993	3*	No	Yes
Manitoba	—	—	—	—
Ontario	1992	33	Yes	Yes
Quebec	1987	60+	No	Yes
New Brunswick	1998	7	—	Yes
Nova Scotia	1994	1	No	Yes
Prince Edward Island	—	—	—	—
Newfoundland and Labrador**	—	6	Yes†	Yes†

* AHT is also available at other sexual health clinics upon request.

** AHT is available upon request but is not part of the official guidelines for the province.

† If someone tests positive for HIV infection through AHT, that individual then becomes part of the nominal/name-based system, in which counselling, follow-up care, and HIV data reporting are all done nominally.

1998, over 45% of the anonymous test users declared that the anonymity of the test was one of their primary reasons for getting tested.[7]

Several studies in the United States have shown that AHT programs encourage people to be tested for HIV infection, especially those at high risk or those who would not volunteer for testing under nominal/name-based or non-nominal/non-identifying circumstances.[8-10]

Interviews of 835 patients with newly diagnosed AIDS in the United States revealed that the availability of anonymous testing was associated with testing closer to the time of HIV infection and, thus, earlier access to medical care.[11]

Comment

HIV infection is legally notifiable in all provinces and territories; however, each has a different practice for reporting HIV infection. Legislation of HIV infection reporting in all Canadian provinces and territories may increase the number of tests received at CIDPC. A change to mandatory reporting of HIV infection in Alberta in 1998 resulted in a significant increase in HIV tests among both men and women.[12] As a result, having HIV notifiable across Canada should allow for the collection of more complete epidemiologic data as well as enable more accurate and timely monitoring of the HIV epidemic.

All provinces and territories in Canada offer at least one of three forms of HIV testing: (1) nominal/name-based, (2) non-nominal/non-identifying, and/or (3) anonymous testing. At present, nominal/name-based and non-nominal/non-identifying HIV testing is widely available in Canada; however, anonymous HIV testing is available in only seven provinces. Increased availability and accessibility to different types of HIV testing may allow individuals to choose the testing and counselling environment in which they feel most comfortable, thereby encouraging more people to be tested and facilitating the targeting of intervention and treatment programs.[13]

References

1. Public Health Agency of Canada. *HIV and AIDS in Canada. Surveillance report to December 31, 2005*. Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, 2006. URL: <http://www.phac-aspc.gc.ca/publicat/aids-sida/haic-vsac1205/pdf/haic-vsac1205.pdf>

2. Houston S, Archibald CP, Strike C et al. *Factors associated with HIV testing among Canadians: results of a population-based survey*. Int J STD AIDS 1998;9:341-46.

3. Choudri Y, Cule S, Archibald CP et al. *Factors associated with testing for HIV among females and males in Canada*. Can J Infect Dis Med Microbiol 2006;17(Suppl A):42A.

4. Jürgens R, Palles M. *HIV testing and confidentiality: a discussion paper*. Canadian HIV/AIDS Legal Network and the Canadian AIDS Society, 1997: 52-69.

5. Ontario Ministry of Health. *Anonymous HIV testing evaluation: January 1992 to June 1993*. Toronto: AIDS Bureau, Ontario Ministry of Health, November 1994.

6. Remis RS, Swantee C, Schiedel L et al. *Report on HIV/AIDS in Ontario 2004*. February 2006. URL: < http://www.phs.utoronto.ca/ohemu/doc/PHERO2004_report.pdf>.

7. Ministère de la santé et des services sociaux du Québec. *Le dépistage anonyme du VIH, 2001*. URL: <http://publications.msss.gouv.qc.ca/acrobat/f/documentation/2001/01-327-01.pdf>.

8. Keagles SM, Catania JA, Coates TJ et al. *Many people who seek anonymous HIV-antibody testing would avoid it under other circumstances*. AIDS 1990;4(6):585-88.

9. Hoxworth T, Hoffman R, Cohn D et al. *Anonymous HIV testing: does it attract clients who would not seek confidential testing?* AIDS Public Policy J 1994;9(4):182-88.

10. Hertz-Picciotto I, Lee LW, Hoyo C. *HIV test-seeking before and after the restriction of anonymous testing in North Carolina*. Am J Public Health 1996;86(10):1446-50.

11. Bindman AB, Osmond D, Hecht FM et al. *Multistate evaluation of anonymous HIV testing and access to medical care*. JAMA 1998;280(16);1416-20.

12. Jayaraman GC, Preiksaitis JK, Larke B. *Mandatory reporting of HIV infection and opt-out prenatal screening for HIV infection: effect on testing rate*. Can Med Assoc J 2003; 168(6);679-82.

13. Hong BA, Berger SG. *Characteristics of individuals using different HIV/AIDS counseling and testing programs*. AIDS 1994; 8:259.

Acknowledgements

National level HIV and AIDS surveillance is possible as a result of all provinces and territories participating in, and setting directions for, HIV and AIDS surveillance. CIDPC acknowledges the provincial/territorial HIV/AIDS coordinators, public health units, laboratories, health care providers, and reporting physicians for sharing non-nominal, confidential data for national surveillance.

For more information, please contact:

Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture
Postal locator: 0602B
Ottawa, ON K1A 0K9
Tel: (613) 954-5169
Fax: (613) 957-2842
www.phac-aspc.gc.ca

Mission

To promote and protect the health of Canadians through leadership, partnership, innovation and action in public health.

Public Health Agency of Canada

Public Health Agency of Canada
Agence de santé publique du Canada
Canada

HIV/AIDS
Epi Update
Centre for Infectious Disease Prevention and Control

HIV and AIDS Among Youth in Canada

At a Glance

- **Youth represent a small proportion of the total number of reported HIV and AIDS cases in Canada. Individuals between the ages of 10 and 24 account for 3.5% of cumulative AIDS cases. For positive HIV test reports, youth between the ages of 15 and 19 account for 1.5% of all reports. In spite of these low proportions, risk behaviour data on young Canadians show the potential for HIV transmission.**
- **A national study found that approximately 50% to 60% of grade 9 and 11 students think there is a vaccine available to prevent HIV/AIDS. The same survey found that 36% of grade 11 students think that there is a cure for HIV/AIDS.**
- **Data from targeted studies show that street-involved youth, youth who inject drugs, and young men who have sex with men are particularly vulnerable to HIV.**
- **A wide range of prevention activities needs to be implemented to help minimize the risk of HIV transmission among youth.**

CIDPC Website:

www.phac-aspc.gc.ca/hast-vsmt/

Introduction

HIV and AIDS surveillance data indicate that youth (defined here as people aged 10 to 24 years) represent a small proportion of the total number of reported HIV and AIDS cases in Canada. At a global level, youth have been greatly affected by the HIV/AIDS epidemic, in that an estimated 10 million people aged 15 to 24 years are now living with HIV.[1] Half of all new infections worldwide are occurring among young people.

Within the Canadian context, the time between age 10 and 24 is a time of transition, and the individuals belonging to this age group represent a variety of subpopulations, including pre-teens, teenagers, and young adults. Combined, these groups make up an important part of the population to target for public health education and prevention activities.

In general, youth are vulnerable to HIV infection as a result of many factors, including risky sexual behaviour, substance use (including injecting drug use), and perceptions that HIV is not a threat to them. To adequately profile HIV and AIDS in the youth population it is necessary to supplement current Canadian HIV/AIDS surveillance data with other relevant data sources, such as health surveys, incidence/prevalence studies, and data on sexually transmitted infections (STIs). This *Epi Update* provides the most current HIV/AIDS surveillance data for Canadian youth as well as information on those factors that put Canadian youth at risk of infection with HIV and AIDS.

AIDS Data

As of December 31, 2005, there were 20,347 AIDS cases with information about age reported to the Centre for Infectious Disease Prevention and Control

(CIDPC). Of these, 710 (3.5%) were among youth aged 10 to 24 years.[2]

As seen in Table 1, of the cumulative reported AIDS cases in youth aged 10 to 19 years, almost two-thirds of cases were recipients of blood or blood products. Among youth aged 20 to 24 years of age with AIDS, roughly half the cases were attributed to men who have sex with men (MSM) and 20.6% to heterosexual contact. Heterosexual contact includes sexual contact with a person at risk of HIV, origin from a country where HIV is endemic, and heterosexual contact as the only identified risk.[2]

HIV Testing Data[2]

Data received from provincial and territorial HIV testing programs do not allow for the creation of the 10 to 24 age group. The closest age group that can be constructed for youth is 15 to 29.

As of December 31, 2005, there were 56,578 positive HIV tests with information about age reported to CIDPC. Of these, 821 (1.5%) were among youth aged 15 to 19 years, and 14,378 (25.4%) were among individuals aged 20 to 29 years.

In 2005, females accounted for 35% of positive HIV test reports among those aged 15 to 29 years (183/523). This proportion is a slight decrease from 42.7% in 2004. When compared with other age groups, the proportion of positive HIV test reports attributed to females is highest among youth. Women in other age groups (i.e., 30-39, 40-49 and over 50) account for approximately 20% to 25% of positive HIV tests.

There were 14 reported HIV tests with known exposure category for 15-19-year olds in 2005. In these reports, the most common risk factor categories were IDU and heterosexual contact with a person at risk (accounting for five reports each) followed by MSM (three reports).

In 2005, MSM, heterosexual contact, and injecting drug use accounted for 41.5%, 34.7%, and 19.4% respectively of reported positive HIV tests with known exposure category among those aged 20 to 29 years.

Table 1. Number of reported AIDS cases and exposure category distribution for individuals 10 to 24 years of age, in Canada, diagnosed up to December 31, 2005

Category	Age group			
	10-19 years		**20-24 years**	
Number of cases	102		608	
Percentage of all reported AIDS cases	0.5%		3.0%	
Number of cases with exposure information	91		573	
	Percentage in each exposure category*			
Exposure category	60.4%	Blood and blood products	51.5%	MSM
	12.1%	Heterosexual contact/endemic	20.6%	Heterosexual contact/endemic
	11.0%	MSM	11.7%	IDU
	8.8%	IDU	9.9%	MSM/IDU
	4.4%	MSM/IDU	6.3%	Blood and blood products
	3.3%	Other + perinatal	0.0%	Other**

*Percentages based on the total number of cases minus those reports for which exposure category was unknown or "not identified". MSM = Men who have sex with men, IDU = Injecting drug users.

**Mode of transmission is known but cannot be classified into any of the major exposure categories.

A cumulative total of 724 positive HIV test reports had been received by December 31, 2005, for individuals less than 15 years of age. Of the 384 cases in this group with known exposure category information, perinatal transmission and exposure to infected blood or blood products accounted for 90.1% of cases.

HIV Incidence and Prevalence Among Youth

HIV prevalence and incidence information, in conjunction with HIV/AIDS surveillance data, are more useful than surveillance data alone for depicting the current magnitude of the HIV epidemic in various population subgroups. To date, a small number of Canadian studies have examined HIV prevalence or incidence among youth, although most research has involved higher-risk populations. A comprehensive inventory of Canadian HIV incidence and prevalence studies as they relate to young adults can be found in the Surveillance and Risk Assessment Division publication *Inventory of HIV Incidence and Prevalence Studies in Canada*.[3] The following list represents the highlights of current incidence and prevalence data among youth:

- I-Track is a second-generation surveillance system of intravenous drug use that tracks HIV, hepatitis C, and associated risk behaviours in urban and semi-urban centres across Canada. Using I-Track data collected between 2003 and 2005, the prevalence of HIV among IDU aged 14 to 24 years was calculated as 5.0%.[4]
- In the Vancouver Injection Drug User Study (VIDUS), the cumulative incidence rate of HIV among IDU aged 24 years and younger after 36 months of follow-up was 11.1%.[5]
- Young Aboriginal IDU in BC have been shown to have a high HIV prevalence rate. Results from the Cedar Project, a prospective study of Aboriginal youth aged 14 to 30 years in Vancouver and Prince George, British Columbia, found an HIV prevalence in 2004 of 19.3% in Vancouver and 9.2% in Prince George among Aboriginal youth who use injection drugs.[6]
- Similar results were found in VIDUS in a comparison of Aboriginal and non-Aboriginal youth (aged 24 years and younger). From 1996 to 2003, 20% of Aboriginal youth and 7% of non-Aboriginal youth tested positive at study enrolment. HIV incidence density over the entire follow-up period for Aboriginal and non-Aboriginal youth was 12.6 per 100 person-years (PY) and 3.9 per 100 PY, respectively. In a multivariate analysis, factors independently associated with HIV seroconversion among the youth were Aboriginal ethnicity (adjusted relative hazard [ARH] = 2.5) and ≥ 1 daily cocaine injection (ARH = 3.9).[7]
- Further information from the VIDUS study presented in 2003 demonstrated a high prevalence of HIV/hepatitis C (HCV) co-infection. A sample of IDU aged 29 and under had a co-infection rate of 16%, while a further 53% were solely HCV positive and 3% were solely HIV positive.[8]
- In the Montreal Street Youth Cohort study (MSYC), participants between 14 and 25 years old have been observed since January 1995. HIV prevalence at study entry in the cohort was 1.4% (14 of 1,013 subjects). HIV incidence up to September 2000 was 0.69 per 100 PY.[9] Among MSM participating in the Montreal Street Youth study in 2000 the prevalence of HIV was 4.9%, and the incidence was 1.2 per 100 PY.[9,10]
- A study focusing on MSM aged 16 to 30 (Omega cohort in Montreal) found that in 2004 MSM under 30 years of age had a slightly higher incidence rate, of 0.70 per 100 PY, compared with 0.57 per 100 PY for MSM aged 30 years and older.[11]
- In Vancouver, the Vanguard study observes young MSM (under 30 years of age) for HIV infection and risk behaviours. Results published in 2003 showed that the incidence of HIV was reported to be 1.9 per 100 PY.[12]

- The Enhanced Surveillance of Canadian Street Youth (E-SYS) is a national, multi-centre, cross-sectional surveillance system of street youth aged 15 to 24 years in Canada. Of the youth tested in 2001, 0.96% were HIV positive; in 2003, 0.66% were positive. The rates differed by age category (younger youth 15-19 years, older youth 20-24 years): in 2001, most HIV infection among street youth was seen in older youth (0.3% vs. 2.3% years respectively). In 2003, all HIV infections were among older youth.[13]

Risk Behaviour Data Among Youth: Findings from Two Canadian Surveys

In 2005, the Canadian Association for Adolescent Health (CAAH) and Ipsos conducted a national online survey of adolescents aged 14 to 17. The sample of 1,171 adolescents was generated by Ipsos-Reid's Canadian Consumer Online Panel. The panel is made up of 150,000 randomly selected households, representing Canada's Internet population. Below are some key findings from this survey.[14]

- Twenty-seven percent reported being sexually active.
- Those who were sexually active had an average of three sexual partners. As well, of the sexually active adolescents, 24% did not use a condom the last time they had sex; 38% engaged in casual sex; 16% reported that their partner had other sexual partners while dating them; and half the condom users reported never checking after sex to see whether their condoms had remained intact.
- Ninety percent of adolescents claimed to be very or somewhat knowledgeable about sex and sexual health. However, the survey found a number of misconceptions regarding common STIs. For example, only 21% knew that cancer was a possible consequence of infection with human papillomavirus.
- Almost two-thirds (62%) faced obstacles or barriers in getting answers to their questions on sexual health, such as their own discomfort in talking about sexual health information.

In 2002, the Canadian Youth, Sexual Health and HIV/AIDS Study (CYSHHAS) was conducted to provide a contemporary picture of the sexual behaviour of adolescents and to increase understanding of the factors that contribute to the sexual health of Canadian youth, with a focus on HIV/AIDS. Administered in all provinces and territories (with the exception of Nunavut), the CYSHHAS surveyed 11,074 students in grades 7, 9, and 11 (approximate ages 12, 14, and 16). The CYSHHAS is the first Canada-wide study to assess adolescent sexual health since the Canada Youth and AIDS Study (CYAS) in 1989.[15] The following information summarizes some key findings from the CYSHHAS.

- Almost one-quarter (23%) of grade 9 boys and 19% of grade 9 girls reported having had vaginal sexual intercourse. By grade 11, this figure had increased to 40% of boys and 46% of girls.
- When compared with the 1989 CYAS, the proportion of students who had had sexual intercourse, across all grade levels, had decreased.
- Sexually active youth are using condoms, but the proportion doing so decreases with increasing age.
- A large proportion of grade 9 students (78%) reported the use of contraception that included a condom the last time they had sex. Among grade 11 students, this proportion decreased to 71%, the most apparent decline occurring among females: 75% of grade 9 females reported using a contraceptive measure that included condoms, and 64% of grade 11 females reported using such measures.
- CYSHHAS students are generally knowledgeable about transmission of and

protection from HIV/AIDS, but knowledge gains need to be made.

- Most students were able to correctly identify the means of transmission of HIV, such as sharing needles, having unprotected sexual intercourse, or having multiple sexual partners, but were less knowledgeable about the increased risk of transmission associated with men who have unprotected sex with men.
- Over two-thirds of grade 9 students and just under half of grade 11 students thought that there is a vaccine available to prevent HIV/AIDS, and a substantial number believed that HIV/AIDS can be cured if treated early. Approximately two-thirds of grade 7 students, half of grade 9 students, and one-third of grade 11 students did not know that there is no cure for HIV/AIDS. These findings suggest that there may be a false sense of complacency about the disease among today's youth.
- There have been little HIV/AIDS knowledge gains since 1989.

The results of these surveys complement the HIV/AIDS surveillance data presented in this *Epi Update*, since positive HIV test reports and AIDS cases alone cannot provide information about the behaviours that put youth at risk of HIV. Limitations of the surveys must be considered when interpreting the findings. The CAAH survey represented a sample of youth who had Internet access in their homes, and the CYSHHAS represented a sample of youth who attend school across Canada. These surveys cannot be generalized to high-risk groups of youth who are less likely to have Internet access or to attend school.

Behaviour Among Higher Risk Populations: An Ongoing Concern

High-risk youth (such as street-involved youth) engage in a variety of behaviours, such as sex trade involvement, low rates of condom use, and injecting drug use, that puts them at increased risk of infection with HIV/AIDS. There are a number of Canadian studies that provide information on HIV/AIDS prevalence in high-risk youth and the behaviours that put this population at risk of HIV/AIDS.

- In a 2001 study of young gay and bisexual men aged 15 to 30 in Vancouver, 16% of the study subjects reported selling sex for money or drugs. HIV prevalence among those who had engaged in prostitution was significantly higher than among those who had not (7.3% versus 1.1%), and incidence was higher as well (4.7 per 100 PY versus 0.9 per 100 PY).[16]
- In an ongoing study of Montreal street youth, only 13.2% of participants reported always using condoms during vaginal intercourse, and only 32.4% reported always using condoms during anal intercourse.[17] Among the 542 male participants recruited in this study from 2001 to 2003, 27.7% reported involvement in survival sex (prostitution). Of the youth reporting anal sex with a male client, 26.7% had unprotected anal sex. For all types of activities (vaginal, oral, or anal sex), the proportions reporting unprotected sex were always higher with non-commercial sexual partners.[18]
- More than 95% of street youth surveyed by E-SYS during the 1999 to 2003 cycles reported being sexually active. The average number of sexual partners was 23 and 22 for male and female street youth respectively. Roughly 50% of street youth reported not using condoms at their last sexual encounter.[13]

Research reveals that levels of injecting drug use and injecting risk behaviours among youth, particularly those who are street-involved, require ongoing assessment:

- In the cohort study of Montreal street youth aged 14 to 23 years, as of August 2003, 31.3% were IDUs. Among these

IDUs, 33.6% reported needle sharing during the previous 6 months.[19]

- Also alarming was the incidence of the initiation of injecting drug use in street youth, estimated to be 23.6 per 100 PY among participants between the ages of 14 and 17 who had not injected drugs at study entry.[20] Predictors of initiation included such risk factors as daily alcohol consumption, survival sex in the previous 6 months, and an episode of homelessness in the previous 6 months.[20]

- In VIDUS, of those aged 29 years and younger at baseline, 38% had initiated injection drug use at age 16 or younger. These young initiators were more likely to be female (adjusted odds ratio [AOR] = 1.63), to be involved in sex work (AOR = 1.61), to engage in binge drug use (AOR = 1.45), to have ever been in juvenile detention or jail (AOR = 1.78), and to be more likely to be HIV positive (OR = 2.6).[21]

- In the Cedar Project in 2004, Aboriginal youth who used injection drugs and were living in Prince George were more likely to report daily use of cocaine (60% vs 42%; $p = 0.052$) and to borrow syringes (24% vs. 13%; $p = 0.013$) than Aboriginal youth living in Vancouver.[6]

- In 2003, 22.3% of youth recruited for E-SYS reported that they had injected drugs in their lifetime and, of these, 31% reported borrowing injection equipment from someone else.[13]

- In data collected from 2003 to 2005 through I-Track, 40.5% of IDU youth aged 14 to 24 years injected themselves with used needles and 61.9% with used equipment.[4]

Sexually Transmitted Infections: An Indicator of Unprotected Sex

Risk data for youth demonstrate unprotected sexual activity. The extent of this activity is further captured in rates of chlamydia and gonorrhea. CIDPC 2004 data (Community Acquired Infections Division, Surveillance and Epidemiology Section, unpublished data) show that the reported incidence of chlamydia and gonorrhea in Canada was highest among individuals aged 20 to 24 years (1,087 /100,000 and 114.4/100,000 respectively).

Comment

HIV/AIDS is affecting many subgroups of the Canadian population, including youth. Although the limited data available suggest that HIV prevalence is currently low among youth, sexual risk behaviour and STI data clearly indicate that the potential for HIV transmission remains significant among young Canadians.

The finding from the CYSHHAS that a substantial number of youth believe that there is a vaccine to prevent HIV/AIDS and that the disease can be cured if treated early is worrisome. Such knowledge gaps need to be addressed by public health education and prevention programs.

More incidence and prevalence information as well as trend data on HIV-related risk behaviours are needed in order to guide and evaluate prevention programs for young Canadians. Epidemiologic and behavioural data for high-risk youth, such as street youth, are also needed to assess fully the risk of HIV transmission in Canada's youth population.

References

1. UNAIDS. *Report on the global HIV/AIDS epidemic*. Geneva, 2004.

2. Public Health Agency of Canada. *HIV and AIDS in Canada. Surveillance report to December 31, 2005*. Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, 2006.

3. Health Canada. *Inventory of HIV incidence and prevalence studies in Canada*. Ottawa: Surveillance and Risk Assessment Division,

Centre for Infectious Disease Prevention and Control, Health Canada, 2004.

4. Public Health Agency of Canada. *I-Track (2003-2005)*. Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control. Unpublished data, April 2006.
5. Miller CL, Spittal PM, Frankish JC et al. *HIV and hepatitis C outbreaks among high-risk youth in Vancouver demands a public health response*. Can J Public Health 2005;96(2): 107-8.
6. Spittal PM, Craib KJ, Schechter MT et al. *HIV and HCV prevalence and risk factors among young aboriginal drug users in Vancouver and Prince George, British Columbia*. Can J Infect Dis 2005;15(Suppl A):33A(Abstract 191).
7. Miller CL, Strathdee SA, Spittal PM et al. *Elevated rates of HIV infection among young Aboriginal injection drug users in a Canadian setting*. Harm Reduct J 2006;3:9.
8. Miller CL, Li K, Braitstein P et al. *The future face of co-infection: prevalence and incidence of HIV and hepatitis C co-infection among young injection drug users*. Can J Infect Dis 2003;14(Suppl A):46A-47A(Abstract 217).
9. Roy E, Haley N, Leclerc P et al. *HIV incidence in the Montreal Street Youth Cohort (MSYC)*. Can J Infect Dis 2002;12(Suppl A):49A (Abstract 317).
10. Roy E, Hayley N, Boivin JF et al. *Étude de cohort sur l'infection as VIH chez les jeunes de la rue de Montréal*. Final report to Health Canada, March 1998.
11. Remis RS, Alary M, Otis J et al., the OMEGA Study Group. *Trends in HIV incidence and sexual behaviour in a cohort of men who have sex with men (MSM) in Montreal, 1996-2003*. Can J Infect Dis 2004;15(Suppl A):54A (Abstract 318).
12. Weber AE, Craib KJ, Chan K et al. *Determinants of HIV seroconversion in an era of increasing HIV infection among young gay and bisexual men*. AIDS 2003;17(5):774-77.
13. Public Health Agency of Canada. *Street youth in Canada: findings from Enhanced Surveillance of Street Youth in Canada*. Ottawa: Public Health Agency of Canada, 2006.
14. Canadian Association for Adolescent Health. *Sexual behaviour and lack of knowledge threaten health of Canadian teens*. CAAH, February 21, 2006. URL: <http://www.acsa-caah.ca/ang/pdf/misc/research.pdf>. Accessed on May 3, 2006.
15. Council of Ministers of Education, Canada. *Canadian Youth, Sexual Health and HIV/AIDS Study. Factors influencing knowledge, attitudes and behaviours*. Council of Ministers of Education, 2003.
16. Weber AE, Craib KJP, Chan K et al. *Sex trade involvement and rates of human immunodeficiency virus positivity among young gay and bisexual men*. Int J Epidemiol 2001;30(6):1449-54.
17. Roy E, Haley N, Leclerc P et al. *Prevalence of HIV infection and risk behaviours among Montreal street youth*. Int J STD AIDS 2000;11(4):241-47.
18. Haley N, Roy E, Leclerc P et al. *HIV risk profile of male street youth involved in survival sex*. Sex Transm Infect 2004;80(6):526-30.
19. Roy E, Haley N, Leclerc P et al. *Needle sharing among young street-based IDUs: need for targeted prevention strategies*. Can J Infect Dis 2004;15(Suppl A):57A(Abstract 326).
20. Roy E, Haley N, Leclerc P et al. *Drug injection among street adolescents – an alarming problem*. Can J Infect Dis 2004;15(Suppl A):64A(Abstract 35P).
21. Miller C, Strathdee S, Kerr T et al. *Factors associated with early adolescent initiation into injection drug use: implications for injection drug use intervention programs*. Can J Infect Dis 2005;15(Suppl A):68A(Abstract 326P).

Acknowledgements

National level HIV and AIDS surveillance is possible as a result of all provinces and territories participating in, and setting directions for, HIV and AIDS surveillance. CIDPC acknowledges the provincial/territorial HIV/AIDS coordinators, public health units, laboratories, health care providers, and reporting physicians for sharing non-nominal, confidential data for national surveillance.

For more information, please contact:

Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture
Postal locator: 0602B
Ottawa, ON K1A 0K9
Tel: (613) 954-5169
Fax: (613) 957-2842
www.phac-aspc.gc.ca

Mission

To promote and protect the health of Canadians through leadership, partnership, innovation and action in public health.

Public Health Agency of Canada

Public Health Agency of Canada
Agence de santé publique du Canada
Canada

HIV/AIDS

Epi Update

Centre for Infectious Disease Prevention and Control

HIV and AIDS Among Women in Canada

At a Glance

- **In Canada, a total of 1,786 AIDS cases and 8,849 HIV cases were reported in adult women up to December 31, 2005.**
- **Women represent an increasing proportion of those with positive HIV test reports in Canada and in 2005 accounted for one-quarter of such reports.**
- **Heterosexual contact and injecting drug use are the two main risk factors for HIV infection in women.**

CIDPC Website:

www.phac-aspc.gc.ca/hast-vsmt/

Introduction

The recent face of the HIV/AIDS epidemic in Canada has changed from what was seen in the early years – a disease that primarily affected men who have sex with men (MSM) – to one that increasingly affects other groups, including injecting drug users (IDU) and heterosexuals. As a result, the number and percentage of women living with HIV/AIDS is increasing. This report updates the status of HIV and AIDS among adult and adolescent women (15 years and older) in Canada up to December 31, 2005.

AIDS Surveillance Data

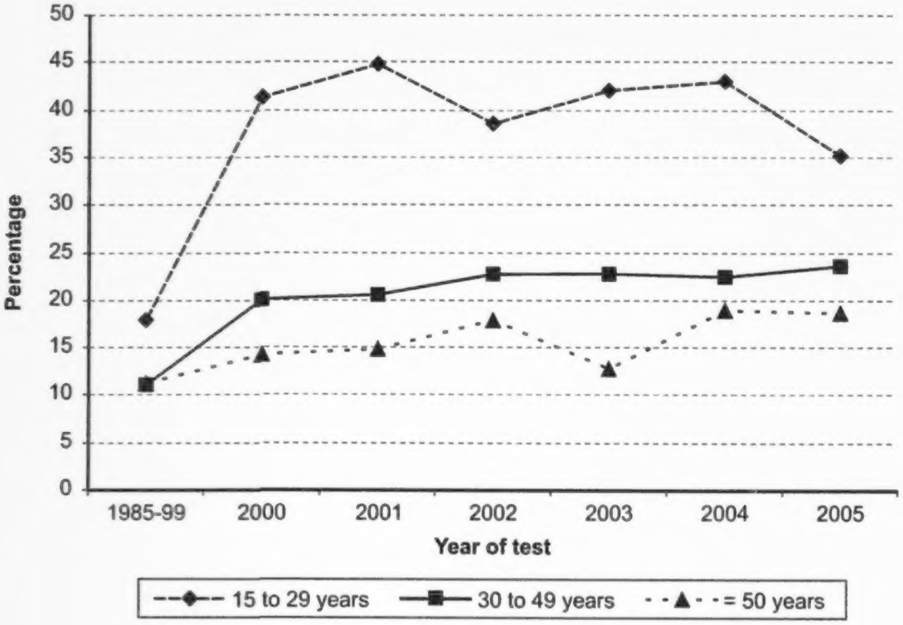
In Canada, 19,238 cumulative AIDS cases in adults were reported to the Centre for infectious Disease Prevention and Control (CIDPC) up to June 30, 2004. Of these, 1,635 (8.5%) were among women. The proportion of all reported adult AIDS cases occurring in women (for which gender and age are known) has increased over time, from 6.4% before 1995 to 12.0% in 2000; in 2003 it again climbed, to 25.2%.[1]

Of all cumulative reported AIDS cases among women up to June 30, 2004, 67.8% were attributed to heterosexual contact* 23.3% to injecting drug use and 8.6% to recipients of blood or blood products. The proportion of adult female AIDS cases attributed to IDU increased from 22.4% before 1999 to 35.5% in 1999 and has since dropped to 17.2% in 2003.[1]

---

* Heterosexual category includes three subcategories: sexual contact with a person who is either HIV infected or at increased risk of HIV infection, origin from a country where HIV is endemic, and sex with the opposite sex as the only identified risk.

Figure 1. Proportion of positive HIV test reports among women by age group and year of test (1985-2005)



HIV Surveillance Data

AIDS data can contribute to an understanding of trends in HIV infections but only in infections acquired approximately 10 years in the past. In contrast, positive HIV test reports provide a picture of more recent infections. Data from provincial and territorial HIV testing programs indicate that a total of 8,849 positive HIV test reports with known age and gender had been reported in adult women up to December 31, 2005.[1] This number does not include those who are infected with HIV but are unaware of their infection or choose not to be tested.

Women account for a growing proportion of positive HIV tests reports with known age and gender among adults in Canada. The proportion of females each year has risen, from 12.0% in the years between 1985 and 1997 to 24.9% of adult positive HIV test reports between 1999 and 2002. In 2005, this proportion again increased, though only slightly to 25.4%.

The proportion of positive HIV test reports in women varies considerably by age and is highest among adolescents and young adults. Females continue to account for a substantial proportion of positive HIV test reports in the 15-29 age group. Since the year 2000, women have accounted for 35% to 45% of tests in this age group (Figure 1).

Among women, the primary exposure categories associated with newly diagnosed HIV infection are, consistently, heterosexual contact and IDU (Table 1). The proportion of positive HIV test reports in women attributed to heterosexual contact has increased over time, from 47.4% for the period 1985-1999 to a peak of 64.6% in 2003. The proportion attributed to IDU varied between 31.6% and 39.9% during the period from 2000 to 2005, with the suggestion of a slight decrease over time (See Table 1).

Heterosexual contact still remains the main risk factor for HIV infection in women, but while it appears that injecting drug use is responsible for a decreasing proportion of cases it is still a significant risk factor. Some studies have found the risk to be greater among female than male IDU.[2] This greater

Table 1. Proportion of positive HIV tests among adult females by exposure category and year of test, Canada, 1985-2005

	Exposure category (%)		
Year	Heterosexual contact*	IDU**	Blood and blood products
1985-99	47.4	40.4	7.0
2000	53.9	39.9	1.6
2001	63.6	31.6	1.5
2002	57.7	37.6	1.4
2003	64.6	26.7	2.8
2004	64.1	31.7	1.6
2005	58.4	34.9	2.2
TOTAL	52.6	37.7	5.0

*Heterosexual category includes three subcategories: sexual contact with a person who is either HIV infected or at increased risk for HIV infection, origin from a country where HIV is endemic, and sex with the opposite gender as the only identified risk.

**IDU: Injecting drug users

degree of risk is sometimes attributable to gender differences associated with injecting practices. The issue of injection drug use is discussed in further detail in the *Epi Updates* entitled HIV and AIDS in Injecting Drug Users in Canada and Risk Behaviours Among Injecting Drug Users in Canada.

HIV Prevalence and Incidence Estimates Show That More Women Are Living with HIV/AIDS

The national HIV prevalence (total number living with HIV) estimates indicate that the number of women in Canada living with HIV, including those with AIDS, continues to grow. By the end of 2005, an estimated 11,800 (10,000-13,500) women were living with HIV, accounting for about 20% of the national total.[3] This represents an increase of 23% from the 9,600 estimated at the end of 2002.

Data from positive HIV test reports (as summarized in the section HIV Surveillance Data) do not provide the complete picture of the annual number of new HIV infections, since only a proportion of those newly infected are tested in the same year. Furthermore, not all HIV tests reported in a given year are from cases infected in that year. The estimated number of new infections (incidence) among women has slightly increased since 2002, when they accounted for 24% of new infections. In 2005, women represented 27% of all new HIV infections or an estimated 620 to 1,240 out of the estimated total of 2,300 to 4,500 new infections in Canada. With respect to the distribution of exposure category among newly infected women, a slightly higher proportion was attributed to the heterosexual category in 2005 as compared with 2002 (76% versus 74% respectively).[3] The remainder of new infections among women were attributed to IDU.

HIV Among Pregnant Women and Women of Childbearing Age

HIV testing during pregnancy is an option available to women across Canada; however, physician guidelines and/or recommendations encouraging informed decisions regarding HIV testing during pregnancy vary by province and territory. These are discussed in detail in the *Epi Update* entitled Perinatal Transmission of HIV.

HIV prevalence studies involving pregnant women can provide an important source of information on the prevalence rate of HIV in the general heterosexual population. Prenatal seroprevalence studies in Canada report an estimated national rate of HIV infection among pregnant women of 2-9/10,000 population.

Anonymous, unlinked seroprevalence studies across the country show that large metropolitan areas report higher rates of HIV infection among pregnant women (4.7 for Vancouver versus 3.4/10,000 for the rest of B.C. in 1994[4] and 15.3 for Montreal versus 5.2/10,000 for the province of Quebec in 1990[5]). Even provinces without large metropolitan areas have indicated significant rates (for example, 4.1/10,000 in New Brunswick for 1994-96[6]). An ongoing study of pregnant Aboriginal women in B.C. reported an HIV prevalence rate of 31.3 per 10,000 pregnancies in 2000-2002 (JD Martin, Programs Medical Officer, Pacific Region, First Nations and Inuit Health Branch, Health Canada: personal communication).

The Alberta universal prenatal HIV screening program reported an HIV infection rate of 33/10,000 pregnancies in 2000.[7] The HIV screening program is an "opt-out" approach, the intent being that HIV testing is performed for all pregnant women unless the woman specifically declines testing. The Alberta screening program has achieved testing rates for HIV among pregnant women of > 95% each year since 2000, the best of any program in North America.[8]

In Ontario, prenatal screening for HIV and for most other infectious markers is carried out by the Ministry of Health. A study of pregnant women was conducted between January 1992 and September 2005. Overall, 259 pregnant women tested HIV positive (3.7/10,000), and in 192 of these the infection was newly diagnosed.[9] A 2002 anonymous seroprevalence study included 33,624 pregnancies never tested for HIV: 21 were HIV positive, for a rate of 6.2/10,000, as compared with 3.1/10,000 among women who had previously been tested.[9]

The B.C. Centre for Disease Control conducted an anonymous antenatal study to determine HIV seroprevalence in British Columbia in 2003. In 1992, the antenatal seroprevalence there was 4.95/10,000 (95% confidence interval [CI] 2.5-9.4), and this had increased to 9.0/10,000 (95% CI 6.0-17.0) by 2003. During this same period, the number of pregnancies managed at the provincial clinic for HIV-positive women increased from 11 per annum to 27 per annum, but the number of newly diagnosed cases of HIV in the province has not increased dramatically in women.[10]

Women with HIV/AIDS face gender-specific social and medical challenges. From 1985-2002, 217 women and 1,691 men were treated at the Southern Alberta HIV Clinic. Men and women were similar in terms of age at presentation (33.2 versus 35.2 respectively) and education. However, they differed with respect to their reasons for HIV testing. Women were more likely to be tested as a result of contact (18% versus 8.6%, $p < 0.0001$), whereas men were more likely to be tested because of illness (26% versus 18%, $p = 0.011$).[11]

Risky behaviours among women, such as unsafe sex and injecting drug use, continue to put women at an increased risk of HIV. An ongoing study involving IDU in different areas across Canada found that, in 2003, about 40% of female IDU reported engaging in commercial sex work. It also showed that about 92% always used condoms with their male client partners, but almost a third never used condoms with their casual partners, and condom use was infrequent with their regular partners.[12]

Recent studies suggest Canadian prisoners are more likely to be infected with HIV and hepatitis C than the average Canadian. Canadian studies have documented a seroprevalence in female prison populations of 0.9%-4.7% for HIV and 25.5%-41.2% for hepatitis C, compared with a general population seroprevalence of 0.2% and 0.8% respectively.[13]

Comment

Women in Canada, especially IDU and women with high-risk sexual partners, are increasingly becoming infected with HIV. The number of new infections in women is still unacceptably high, and the proportion of positive tests attributed to women continues to account for approximately 25% of new reports. The prevalence estimates indicate that more women were living with HIV in 2005 than in 2002, and this has implications for prevention and care programs. Efforts to reduce transmission of HIV among women will need to focus not only on promoting safer sexual behaviours and reducing substance abuse but also on the intersection between the two and the underlying factors that put women at increased risk of HIV infection.

HIV testing, counselling, and care are vital to prevent and control HIV infection. More enhanced data on the trends, risk factors, and geographic differences that affect HIV in Canadian women are needed to help target prevention and care programs.

References

1. Public Health Agency of Canada. *HIV and AIDS in Canada. Surveillance report to December 31, 2005.* Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, 2006.
2. Spittal PM, Craib KJP, Wood E et al. *Risk factors for elevated HIV incidence rates among female injection drug users in Vancouver*. Can Med Assoc J 2002;166(7): 894-99.
3. Boulos D, Yan P, Schanzer D et al. *Estimates of HIV prevalence and incidence in Canada, 2005.* CCDR 2006;32(15) (in press).
4. Pi D, Ballem PJ, Schechter MT. *The B.C. Prenatal Study: 1989-94*. Final report to Health Canada, January 1995.
5. Hankins C, Hum L, Tran T et al. *HIV seroprevalence in women giving birth to live infants in Northern Quebec (1989-93).* Can J Infect Dis 1995;6(Suppl):B39 (Abstract 314).
6. Getty G, Leighton P, Mureika R et al. *NB antenatal seroprevalence study*. Can J Infect Dis 1997;8:24A(Abstract 205).
7. Jayaraman GC, Preiksaitis JK, Larke B. *Mandatory reporting of HIV infection and opt-out prenatal screening for HIV infection: effect on testing rates*. Can Med Assoc J 2003; 168(6):679-82.
8. Singh AE, Gill J, Houston S. *New resources on screening for HIV in pregnancy*. Alberta RN 2005;61(8):11.
9. Remis SR, Swantee C, Major C et al. *Evaluation of HIV screening in pregnancy in Ontario: an update*. Can J Infect Dis Med Microbiol 2006;17(Suppl A):(Abstract 301).
10. Ogilvie G, Krajden M, Patrick DM et al. *Antenatal seroprevalence of HIV in British Columbia*. Can J Infect Dis Med Microbiol 2006;17(Suppl A):(Abstract 342P).
11. Hwang L, Henry M, Raffa J et al. *Demographic characteristics of women living with HIV/AIDS in Southern Alberta, 1985-2002*. Can J Infect Dis Med Microbiol 2006;16(Suppl A):(Abstract 337P).
12. Health Canada. *I-Track: enhanced surveillance of risk behaviours among injecting drug users in Canada. Pilot survey report, February 2004.* Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Health Canada, 2004.
13. Martin RE, Gold F, Murphy W et al. *Drug use and risk of bloodborne infections: a survey of female prisoners in British Columbia*. Can J Public Health 2005;96(2):97-101.

Acknowledgements

National level HIV and AIDS surveillance is possible as a result of all provinces and territories participating in, and setting directions for, HIV and AIDS surveillance. CIDPC acknowledges the provincial/territorial HIV/AIDS coordinators, public health units, laboratories, health care providers, and reporting physicians for sharing non-nominal, confidential data for national surveillance.

For more information, please contact:

Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture
Postal locator: 0602B
Ottawa, ON K1A 0K9
Tel: (613) 954-5169
Fax: (613) 957-2842
www.phac-aspc.gc.ca

Mission
To promote and protect the health of Canadians through leadership, partnership, innovation and action in public health.
Public Health Agency of Canada

HIV/AIDS

Epi Update

Centre for Infectious Disease Prevention and Control

HIV/AIDS Among Older Canadians

At a Glance

- **As of December 31, 2005, 12.1% (2,467) of all reported AIDS cases have been persons aged 50 years or older.**
- **Approximately 10% of the positive HIV test reports in Canada each year since the beginning of the epidemic have been in those aged 50 years or older. In recent years, this figure has increased to over 13%.**
- **Sexual contact is the major risk factor for HIV infection in older Canadians. In 2005, the MSM and heterosexual contact exposure categories each accounted for 38.6% of positive HIV test reports in those over 50 years old.**
- **Men account for most of the reported AIDS cases and positive HIV test reports among older Canadians: 90.5% and 86.8% respectively.**

CIDPC Website:

www.phac-aspc.gc.ca/hast-vsmt/

Introduction

HIV/AIDS is generally believed to be a young person's disease and, consequently, little focus has been given to the issue of HIV/AIDS in older Canadians. It should be noted that the age range for "older" is subjective, and the lower age limit in that category in the literature varies between 40 years and 55 years of age. For the purpose of this *Epi Update*, older individuals will be defined as those aged 50 years or older.

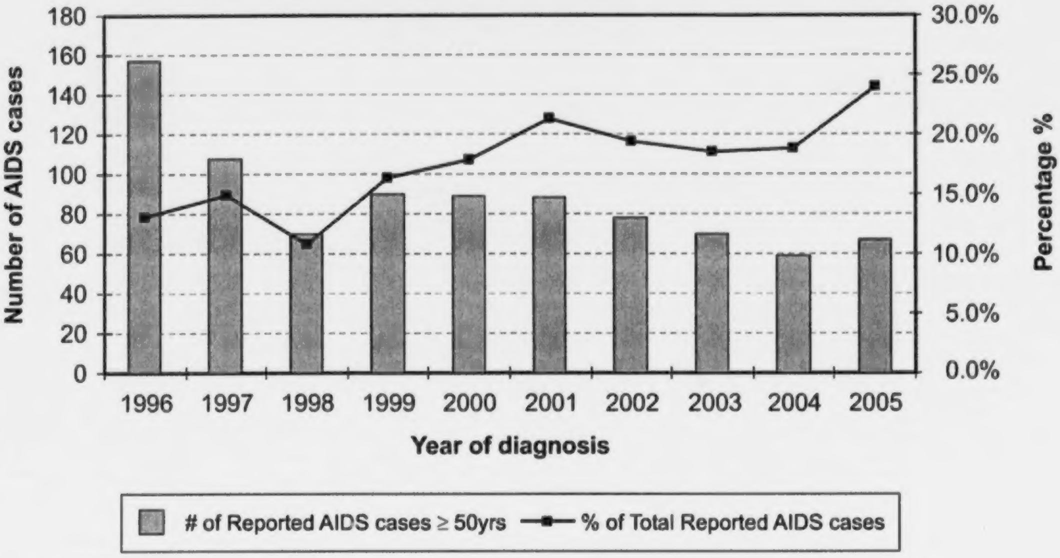
In the over-50 population it is important to consider that the AIDS epidemic actually affects two groups: those who become infected at the age of 50 years or older and those who are infected with HIV at earlier ages but are now living longer before progression to AIDS. The better treatment of AIDS, through highly active antiretroviral therapy has resulted in decreased mortality, which may contribute to higher HIV prevalence among people over the age of 50. Continuous monitoring of HIV surveillance data will be needed in this age group.

AIDS Case Report Data[1]

As of December 31, 2005, there have been 20,353 AIDS cases with age information reported to the Centre for Infectious Disease Prevention and Control (CIDPC). Of these reports, 2,467 (12.1%) have been among persons 50 years of age or older.

Figure 1 shows the number of reported AIDS cases and the proportion among those aged 50 years or more. The overall trend is toward an increase in the proportion of AIDS cases among older Canadians with some year-to-year variability due to small numbers.

Figure 1. Number of reported AIDS cases among persons 50 years and older and percentage of all reported AIDS cases by year (1996-2005)*



* Quebec AIDS data have not been available since June 30, 2003, and Ontario AIDS data by exposure category were not available for the second half of 2005

An increasing trend has been observed in the United States,[2] where the proportion of new AIDS cases among individuals aged 50 years has increased over time, to a high of approximately 14% in 1999. Mack and Ory[2] suggest that this increase could be due to the following factors: an actual increase in new AIDS cases, better case reporting of the older population than earlier in the epidemic or a delayed progression to AIDS because antiretroviral therapy prolongs the period from HIV infection to AIDS.

Table 1 shows the distribution of exposure categories for all reported AIDS cases among older Canadians up to December 31, 2005. Men who have sex with men (MSM) made up the majority of reported cases among those aged 50-59 and those aged 60 years and older. Other exposure categories included heterosexual contact and exposure to blood and blood products (before 1985).

The Changing AIDS Epidemic

Figure 2 displays the proportion of reported AIDS diagnoses by exposure category and year of diagnosis among those aged 50+ years. Although Quebec AIDS data have not been available since June 30, 2003, and Ontario AIDS data by exposure category were not available for the second half of 2005, the overall trends show a decrease in the proportion of AIDS cases that are MSM and an increasing trend for the heterosexual contact exposure category. While heterosexual contact has overtaken the MSM exposure category among AIDS cases in the general population,[1] more years of surveillance data will be needed to see whether this trend in the older population continues.

Positive HIV Test Reports[1]

While AIDS data provide information on HIV infection that occurred about 10 years in the past, HIV data provide a picture of more recent infections.

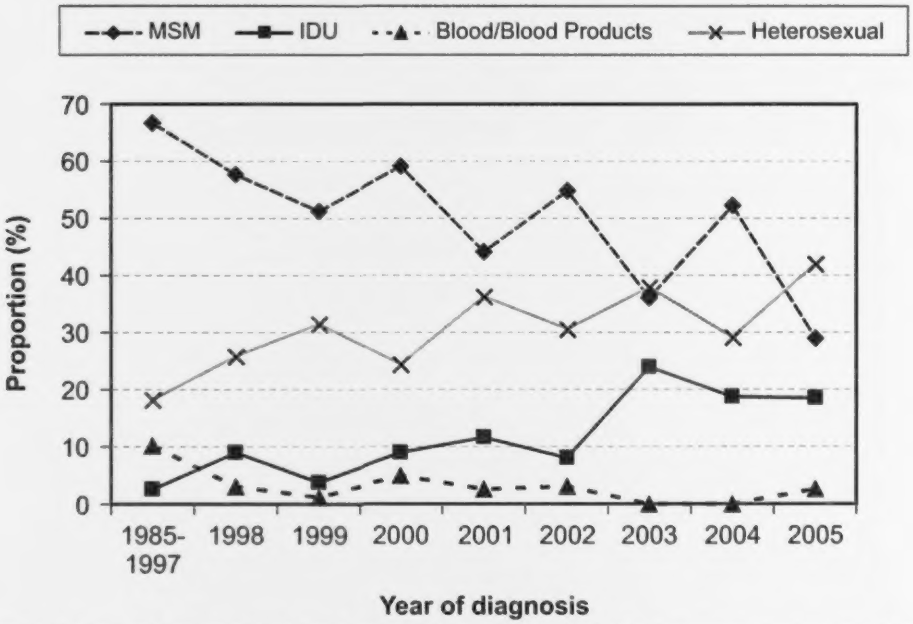
Table 1. Distribution of exposure categories among AIDS cases reported up to December 31, 2005, for individuals 50 years of age and older in Canada

	Age Group	
	50-59 years	**≥ 60 years**
Number of cases	1,805	662
Percentage of all reported AIDS cases	8.9	3.3
Number of cases with exposure information	1,640	590
Exposure category:*	**Percentage in each exposure category****	
MSM	67.9	51.0
MSM/IDU	2.4	0.7
IDU	5.4	2.0
Recipient of blood/blood products	5.3	16.3
Heterosexual contact	18.7	29.7
Occupational & Other	0.2	0.3

*As a result of recent changes in the reporting of AIDS cases in Ontario, exposure category was not available for cases reported in the second half of 2005, and these cases were categorized as exposure category not reported. MSM: men who have sex with men; IDU: injecting drug users; heterosexual contact: sexual contact with a person at risk of HIV, origin from a country where HIV is endemic, and heterosexual contact as the only identified risk; Other: mode of transmission is known but cannot be classified into any of the major exposure categories.

**Percentages based on the total number of cases minus those reports for which exposure category was unknown or "not identified".

Figure 2. Proportion of reported AIDS diagnoses by exposure category and year of diagnosis among persons 50 years and older*



*Quebec AIDS data have not been available since June 30, 2003, and Ontario AIDS data by exposure category were not available for the second half of 2005

Data from provincial and territorial HIV testing programs indicate that 4,913 positive HIV tests with information on age were reported among persons 50 years and older up to December 31, 2005. The proportion of annual positive HIV test reports among those aged 50 years or older has risen from 7.5% between 1985 and 1998 to a high of 13.5% in 2005.

Table 2 summarizes exposure categories associated with positive HIV test reports among adults over the age of 50. In 2005, more than three-quarters of positive HIV test reports in this age group with known exposure category information were attributable to MSM (38.6%) and heterosexual contact (38.6%).

Table 2. Distribution of exposure categories among individuals in Canada aged 50 years and older with positive HIV tests reported between January 1, 2005, and December 31, 2005

	Age 50 and older
Number of cases	332
Number of cases with exposure information	140
Exposure category:*	**Percentage in each exposure category****
MSM	38.6
MSM/IDU	2.1
IDU	15.0
Recipients of blood/ blood products	1.4
Heterosexual contact	38.6
Occupational and other	4.3

*MSM: men who have sex with men; IDU: injecting drug users; heterosexual contact: origin in a pattern II country, sexual contact with a person at risk, or no identified risk other than heterosexual contact; Other: mode of transmission is known but cannot be classified into any of the major exposure categories.

**Percentages based on the total number of cases minus those reports for which exposure category was unknown or "not identified".

Men Account for Most of the AIDS and HIV Cases Among Older Canadians

In the over-50 age group, men account for a majority of the AIDS and HIV cases reported to CIDPC. Of the 2,466 cumulative AIDS cases with known age and gender information, men accounted for 90.5% of cases. Among the cumulative positive HIV test reports with known age and gender information, men accounted for 86.8% of the cumulative 4,662 reports.

In 2005, the gender distribution among the over-50 age group (86.3% male) contrasts with that of other age groups, in which men account for just under two-thirds (64.8%) of positive HIV test reports in adults aged 15 to 29 and three-quarters (74.9%) in the 30-39 age group. The over-representation of men in the over-50 age group means that the observed trends in exposure category data (as summarized in Figure 2) are largely influenced by the male population. It also has implications for the ability to conduct detailed monitoring of exposure category information among females over the age of 50 because of sample size.

More Information Needed: Older Adults and Risk Behaviours, and Knowledge of HIV/AIDS

Healthy sexual relationships continue to be an important part of life for the majority of older adults. The availability of sexual partners and health status may be more important factors than age in determining sexual activity.[3]

- In a global study on sexual attitudes and behaviours, in which 1,000 Canadians aged 40-80 years were polled, 76% reported having had sexual intercourse in the previous 12 months; of these, 68% reported having intercourse more than once per week.[4]

- In another international study of adults aged 45 years and older (*n* = 1,384), 51.7% of men and 55.1% of women who reported having a sexual partner (*n* = 949) revealed that they had had sexual intercourse once a week or more during the previous 6 months.[3]

Although surveillance data for Canada suggest that sexual contact is the major risk factor for HIV infection among older adults, very little research has been conducted on risky sexual behaviour in this group; however, some survey information is available:

- In a 22-site survey of HIV-positive women aged 45 years or older in BC, 41% had been sexually active in the previous 6 months. Of these, however, only 28% reported that they always used birth control, and only 13.2% chose birth control methods in order to prevent STD's/HIV.[5]
- Table 3 shows selected sexual risk behaviours among respondents aged 45+ compared with those aged 20-44 years from the Canadian HIV/AIDS Attitudinal Survey conducted in 2003.[6] While sexual risk behaviours were reportedly lower among older participants, they were not insubstantial.

A handful of studies suggest that some older adults may not be aware of HIV prevention methods or behaviours that put them at risk of HIV:

- In a US study of 514 women over the age of 50,[8] researchers found that although 84% of women correctly identified unprotected heterosexual sex as a moderate- to high-risk activity, women frequently answered questions related to the effectiveness of condoms and abstinence incorrectly. Only 13% identified condoms as very effective in the prevention of HIV, whereas 18% said they were not at all effective. Almost half (44%) of the women said that abstinence was not at all or somewhat effective.
- A survey in 2003 of 2,004 Canadians aged 15 years and over reported that seniors are generally misinformed about overall HIV transmission methods. Twenty percent of seniors cited a sneeze or a cough as a likely method of transmission. This same study also reported that seniors perceive HIV/AIDS as being mostly a gay person's disease (35%), a Third World disease (41%), and a drug users' disease (29%).[6]
- In a 1996 US-based study, 14.7% of the respondents age 50 to 64 compared with

Table 3. High-risk sexual behaviours among Canadians aged 20-45 years compared with those aged 45 years and over, HIV/AIDS Attitudinal Survey 2003[7]

Age category	Never practise safe sex†*	3+ sexual partners in previous year**
20-44 yrs	19%	3%
45+ yrs	15%	1%

†Safe sex refers to sexual practices that lower the risk of sexually transmitted infections, including HIV/AIDS.

*As a percentage of those whose sexual partner in the previous 12 months was casual.

**As a percentage of those who were sexually active in the previous 12 months.

6.3% of respondents aged 18 to 49 did not know whether condoms were effective in preventing HIV infection.[9]

- Research about risk behaviours among older high-risk populations, such as injecting drug users, tends to be sparse:
    - In a US[10] study comparing 1,508 older drug users (IDU and crack/cocaine smokers over the age of 50) with 1,515 younger drug users (under the age of 50), older drug users were found to be less likely to have had sex in the prior month, but those who had had sex reported as much risky behaviour as their younger counterparts. Older drug users were found to be significantly less risky in their needle sharing practices than those under the age of 50.

HIV Testing Patterns

- In Canada, between 1996 and 2005, over 50% of reported AIDS diagnoses in those aged over 45 years were made within 12 months after the first HIV positive test.[11]
- Two cross-sectional, general population surveys conducted in 1996[12] and 2003[7] demonstrate that lifetime testing among those aged 55 years and older is less than at other ages. Table 4 displays the percentage of lifetime HIV testing by age group, and the results suggest that older Canadians are less likely to have had an HIV test during their lifetime than younger ones. Nonetheless, it is encouraging that between 1996 and 2003, overall lifetime testing appeared to be increasing. It must be noted, however, that although results from these surveys have been weighted to reflect population demographics, the differences in sampling methodologies between the two surveys may account for some of the differences.

Table 4. Lifetime testing for HIV

	1996 National Population Health Survey[12]	2003 HIV/AIDS Attitudinal Survey[7]
Age category	Percentage of lifetime HIV testing	
20-44 yrs	21.7	39.2
45-54 yrs	11.4	26.1
55-64 yrs	6.5	15.0
65+ yrs	3.2	7.3

Comment

Older adults account for a minority of reported HIV and AIDS cases in Canada. The distribution of age among positive HIV tests reported to the Public Health Agency of Canada shows that there is a shift towards an older age group, most marked in males.

More epidemiologic and behavioural data are needed to better understand the HIV/AIDS situation among older adults to inform prevention and care programs. Population-based surveys should continue to include questions regarding condom use and number of sexual partners as well as HIV testing behaviours, for all age groups.

Attitudes and knowledge about HIV/AIDS should be studied among those aged 50 years and older in order to assess the potential misconceptions or knowledge gaps that older adults may have with regard to HIV transmission and prevention. Given that one of the main exposure categories among older adults with reported positive HIV tests is sexual contact (MSM and the combined heterosexual category), research into the sexual risk behaviours of older Canadians needs to be supported.

As our society ages and persons with HIV/AIDS live longer as a result of improved medical treatment, it is likely that HIV/AIDS among older adults will become a broader issue. While older adults have historically been excluded from many aspects of HIV/

AIDS policy and programming, the available data show that this should not be the case. The data presented here should help to overcome the ageist assumption that persons aged 50 years and older are not at risk of HIV infection.

References

1. Public Health Agency of Canada. *HIV and AIDS in Canada. Surveillance report to December 31, 2005.* Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, 2006. URL: <http://www.phac-aspc.gc.ca/publicat/aids-sida/haic-vsac1205/pdf/haic-vsac1205.pdf.>
2. Mack KA, Ory MG. *AIDS and older Americans at the end of the twentieth century.* JAIDS 2003;33:S68-S75.
3. *AARP/Modern Maturity Sexuality Survey.* August 1999. URL: <http://research.aarp.org/health/mmsexsurvey_1.html>.
4. Pfizer Inc. *The Pfizer global study of sexual attitudes and behaviours*, 2002.
5. Ogilvie GS, Maan E, Palepu A, et al. *Sexual health concerns and contraceptive choices of HIV positive women over the age of 45.* Can J Infect Dis Med Microbiol 2005;16(Suppl A):64A.
6. Ekos Research Associates, Inc. *HIV/AIDS – an attitudinal survey. Final Report.* June 24, 2003.
7. Ekos Research Associates, Inc. *HIV/AIDS – an attitudinal survey, 2003.*
8. Henderson SJ, Bernstein LB, St. George DM et al. *Older women and HIV: How much do they know and where are they getting their information?* J Am Geriatr Soc 2004;52:1549-1553.
9. Mack KA, Bland SD. *HIV testing behaviours and attitudes regarding HIV/AIDS of adults aged 50-64.* Gerontologist 1999;39(6):687-94.
10. Kwiatkowski CF, Booth RE. *HIV risk behaviours among older American drug users.* JAIDS 2003;33:S131-S137.
11. Stokes J, Pennock, J, Archibald CP. *Factors associated with late HIV diagnosis in Canada, 1996-2005.* 16th International AIDS Conference, Toronto, Canada, August 13-18, 2006.
12. Statistics Canada. *National Population Health Survey 1996-97.* Public use health file. Ottawa: Statistics Canada.

Acknowledgements

National level HIV and AIDS surveillance is possible as a result of all provinces and territories participating in, and setting directions for, HIV and AIDS surveillance. CIDPC acknowledges the provincial/territorial HIV/AIDS coordinators, public health units, laboratories, health care providers, and reporting physicians for sharing non-nominal, confidential data for national surveillance.

For more information, please contact:

Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture
Postal locator: 0602B
Ottawa, ON K1A 0K9
Tel: (613) 954-5169
Fax: (613) 957-2842
www.phac-aspc.gc.ca

Mission
To promote and protect the health of Canadians through leadership, partnership, innovation and action in public health.
Public Health Agency of Canada

Public Health Agency of Canada
Agence de santé publique du Canada
Canada

HIV/AIDS
Epi Update
Centre for Infectious Disease Prevention and Control

Perinatal Transmission of HIV

At a Glance

- **HIV testing and antiretroviral treatment can dramatically reduce perinatal HIV transmission.**
- **The HIV prevalence rate in Canada during 1994-2005 among pregnant women is approximately 2 to 9 per 10,000.**
- **The use of antiretroviral therapy by HIV-positive pregnant women is increasing.**
- **All women should have access to prenatal care that includes an offer of HIV testing.**

CIDPC Website:

www.phac-aspc.gc.ca/hast-vsmt/

Introduction

In the absence of any intervention, an estimated 15% to 30% of women with HIV infection will transmit the infection during pregnancy and delivery, and 10% to 20% through breast milk to their new-born child.[1] Transmission of HIV from an HIV-infected pregnant woman to her newborn child is known as either mother-to-child, perinatal, or vertical HIV transmission. HIV infection of the child can occur during gestation (in utero), during delivery (when the fetus makes contact with maternal blood and mucosa in the birth canal), or after delivery (through breast milk). In this *Epi Update*, the status of perinatal HIV transmission in Canada and HIV testing recommendations for pregnant women are discussed.

Positive HIV Test Reports

Between 1985 and the end of December 2005, there were 60,160 positive HIV tests among adults reported to the Centre for Infectious Disease Prevention and Control (CIDPC), Public Health Agency of Canada, including 8,849 (16.2%) among women. Of the adult women with positive HIV test reports, 76.5% were between 15 and 39 years of age.[2]

HIV Infection among Pregnant Women

HIV prevalence studies involving data from the testing of pregnant women indicate a rate for Canada of about 2-9 per 10,000, although rates are not available for all provinces/territories, and data for some provinces have not been updated for more than 10 years. Rates for selected provinces are illustrated in Table 1.

In Ontario, a total of 105 infants (2 years old) born between 1984 and 2001 were confirmed as being HIV infected. Almost 56% of the HIV-positive mothers reported that their risk factor for HIV infection was being from an HIV-endemic country (a country in

Table 1. HIV prevalence among pregnant women in Canada

Province	HIV prevalence/ 10,000 pregnant women	Year
British Columbia	9.0	2003[3]
Alberta	3.3	2000[4]
Manitoba	3.2	1994-1995[5]
Ontario*	2.3	2005[6]
Quebec	5.2	1990[7]

*Of the 85.5% of pregnant women tested for HIV

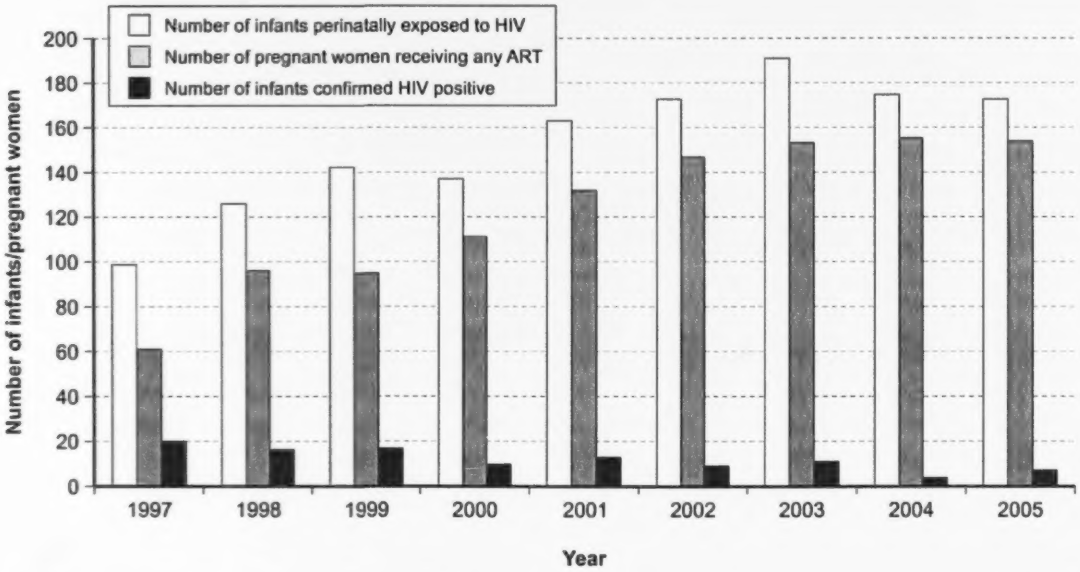
which the predominant means of HIV transmission is heterosexual contact). Another 32% reported non-endemic heterosexual contact, and 9% reported injecting drug use.[8]

In Quebec, between July 1997 and June 2001, nearly 60% of the 209 HIV-infected pregnant women were born in an endemic country. Of these women, 73 (34.9%) were African and 52 (24.9%) were Haitian.[9]

Transmission of HIV from Mother to Infant

According to the Canadian Pediatric AIDS Research Group (CPARG), the annual number of perinatally HIV-exposed infants increased from a range of about 50 to 70 per year in the early 1990s to 173 in 2005, as seen in Figure 1. Of the reported 2,206 infants who were exposed to HIV from their mothers between 1984 and 2005, 496 have been confirmed as infected. An additional 80 have an infection status that has not been confirmed (this includes indeterminate serostatus, died or lost to follow-up).[2] The remaining 1,612 infants have been confirmed as not infected with HIV.

Figure 1. Reported number of infants perinatally exposed to HIV, number of pregnant women receiving antiretroviral therapy (ART), and the number of infants with confirmed HIV infection, 1997-2005



Provincial/Territorial Prenatal HIV Screening Recommendations

In all Canadian provinces and territories, HIV testing of pregnant women remains the choice of the woman. Guidelines and/or recommendations for HIV testing of pregnant women have been developed in each province and territory to encourage informed decision-making. A summary of the various prenatal HIV testing approaches in Canada is given in Table 2.

Table 2. Prenatal HIV testing approaches across Canada and year of implementation/recommendation*

Province/territory	Testing approach	Year
British Columbia	HIV testing is offered as part of routine prenatal care with informed consent and pre- and post-test counselling.	1994
Yukon	HIV testing of pregnant women is strongly recommended and testing of sex partner is also encouraged.	1994
Northwest Territories	Prenatal HIV testing was introduced in 1993 as an opt-in program, and in 1998 became integrated with routine prenatal care, although women have the opportunity to opt out and decline testing.	1993, revised 1998
Nunavut**	Same policy as Northwest Territories	1999
Alberta	HIV screening is part of routine prenatal blood tests for all women in Alberta, and HIV testing is done unless the woman declines to be tested (opt-out policy).	1998
Saskatchewan	Consent is obtained before any testing is done and appropriate pre- and post-test counselling are provided.	1999
Manitoba	It is strongly recommended that all health care professionals provide appropriate information and offer testing for HIV to all pregnant women as part of routine prenatal care. The decision not to be tested should be voluntary (i.e. opt-out option) and based on informed choice.	2002
Ontario	All pregnant women are offered an HIV test as part of prenatal care, with informed consent and appropriate pre- and post-test counselling.	1998
Quebec	HIV screening is part of routine prenatal blood tests for all women, and HIV testing is done unless the woman declines to be tested.	2002
New Brunswick	Physicians are to routinely encourage all pregnant women to be tested for HIV with appropriate pre- and post-test counselling and informed consent. Currently working to develop "opt-out" policy as the standard for HIV testing among pregnant women	1999 2004
Nova Scotia	HIV testing is offered to all pregnant women with the other prenatal tests in the first trimester. Women who decline testing in the first trimester or who are known to engage in high-risk activities are to be offered testing again during the latter stages of pregnancy.	1998
Prince Edward Island	HIV testing is recommended for all pregnant women and is offered at the first prenatal visit.	1999
Newfoundland and Labrador	HIV testing is part of routine prenatal screening and is done unless the woman declines.	1997

*As supplied by provincial/territorial HIV/AIDS data coordinators.

**Nunavut became a new territory in April 1999 after separating from the Northwest Territories.

A 2-year chart review of pregnant women, which began 8 months after universal prenatal counselling and vertical transmission guidelines were put into place in

Ontario, indicated that perinatal transmission was continuing. As a result, the study authors concluded that existing guidelines were not being fully adopted and suggested that, to further decrease perinatal transmission, Ontario should include HIV testing as a routine prenatal test under an opt-out strategy, ensuring that women are advised that they may refuse testing.[10]

More recently, a clinical study in Toronto reported that HIV testing acceptance rates are influenced by the screening strategy used. The authors found that by using an opt-out strategy in their clinic, testing acceptance rates were higher than the provincial average. The authors recommend that an opt-out strategy be considered in all jurisdictions.[11]

Canadian Women Can Access Prenatal HIV Screening Programs

Data from prenatal HIV screening programs can provide important information on the effectiveness of prenatal HIV screening recommendations. Data from several provinces are provided below.

British Columbia: In 1995, about 55% of pregnant women in BC were tested for HIV. This percentage was estimated to be up to 80% in 1999, 60% through routine prenatal testing and 20% through groups identified as being at high risk. Between October 1, 2003, and October 31, 2004, 83% of pregnant women in BC for whom prenatal bloodwork was carried out had an HIV test as part of that testing (Elsie Wong, BC Field Surveillance Officer, Public Health Agency of Canada: personal communication, April 2006).

Alberta: It is thought that the vast majority of pregnant women in Alberta are receiving HIV testing as part of prenatal care. The Alberta Provincial Laboratory for Public Health reports that 4.1% of all specimens submitted for prenatal screening in 2003 were not tested for HIV because the woman had opted-out of HIV screening. This proportion decreased to 3.6% in 2004 and 3.5% in 2005 (Dr. Bonita Lee, Alberta Provincial Laboratory for Public Health: personal communication, April 2006).

Manitoba: Approximately 60% of women seeking prenatal care in Manitoba are tested for HIV. Manitoba Health is currently evaluating the introduction of the opt-out testing policy and the impact it has had on testing pregnant women for HIV (Trina Larsen, Manitoba Health: personal communication, January 2005).

Ontario: HIV testing of pregnant women gradually increased from 46.6% in 1999 (40.7% during the pregnancy and 5.8% previously) to 91.1% during 2005 (85.5% during the pregnancy and 5.6% previously).[6]

Quebec: A recent study examined changes in medical practice regarding prenatal HIV testing in Ste-Justine Hospital, the referral centre for the province of Quebec, after the 1997 implementation of the HIV screening strategy during pregnancy. The program consists of universal counselling and offers HIV testing to all pregnant women. The study found that the percentage of HIV tests offered to pregnant women was 61.8% in 2001.[9] Of the 58 HIV-positive pregnant women seen at this hospital in 2002, 33 were given a diagnosis of HIV before pregnancy and 20 during pregnancy.[12] In the first 6 months of 2003, 47 HIV-positive pregnant women were seen at Ste-Justine Hospital: eight women had received an HIV diagnosis before their pregnancy and 39 during pregnancy.[12]

Newfoundland and Labrador: Since the 1997 implementation of Newfoundland and Labrador's policy of testing pregnant women, unless the woman declines, 94% of all pregnant women have been tested. The last case of perinatal transmission was reported in 1998 (Cathy O'Keefe, Department of Health and Community Services: personal communication, April 2006).

Northwest Territories: The opt-out program in the NWT was assessed in 2001, 2002, and 2003. In 2001, one community did not screen all patients because of misinterpretation of the opt-out process. There is no evidence that prenatal women are declining HIV testing. Since 2002, all prenatal women have been screened for HIV (Wanda White, Health and Social Services: personal communication, April 2006).

Antiretroviral Treatment Can Reduce the Likelihood of Transmission of HIV from Mother to Infant during Pregnancy

HIV testing during pregnancy can provide the opportunity to offer antiretroviral treatment to the mother and infant as, for example, in the following:

In 1994, the Pediatric AIDS Clinical Trials Group, Protocol 076, demonstrated that a three-part course of AZT (zidovudine) could reduce the risk of mother-to-child HIV transmission by nearly 70%.[13] Much progress has been made since then, and while AZT monotherapy can substantially reduce the risk of mother-to-child HIV transmission, it is now considered suboptimal for the treatment of HIV infection. Combination drug treatments are considered to be the standard of care.[14]

Although treatment with ZDV alone can substantially reduce the risk of mother-to-child HIV transmission, monotherapy is now considered suboptimal for the treatment of HIV infection and combination drug treatments are considered to be the standard of care.[15]

Figure 1 displays data from the national surveillance program of pediatric centres and HIV clinics in Canada (where 95% of infants exposed to mothers with diagnosed HIV are followed) and shows that as more women receive antiretroviral therapy fewer children become infected. In fact, the proportion of pregnant women receiving antiretroviral therapy has increased steadily in the last 10 years, from 62% in 1997 to 81% in 2000 and 89% in 2005. Meanwhile, the HIV infection rate of perinatally HIV-exposed infants has decreased significantly over time in Canada because of antiretroviral therapy, from 20% in 1997 to 4% in 2005.[2]

CPARG reported that from 1990 to 2005, of cases in which antiretroviral therapy was used prophylactically, only 2% of infants became infected, as compared with 14% of cases in which antiretroviral therapy was not administered.[15]

In Quebec, at Ste-Justine Pediatric Hospital, the use of AZT reduced the likelihood of mother-to-infant HIV transmission from 28.3% transmission among mother-infant pairs who had not received any AZT to 3.8% among mother-infant pairs who had received partial or full AZT therapy.[16]

A study done from 1993 to 1999 on AZT use in British Columbia found a reduction in the HIV vertical transmission rate, from 28% in untreated women-infant pairs to 13% in partially treated pairs and 0% in completely treated pairs.[17]

In Alberta, a study examining the prevention of perinatal HIV transmission from 1998 to 1999 found that when HIV-positive mothers were treated with antiretrovirals during pregnancy and the intrapartum period, 31 of 36 babies (86%) were not HIV infected.[18]

Canadian Prenatal HIV Screening Programs Are Valuable

Screening pregnant women for HIV clearly represents an important opportunity to prevent the transmission of HIV to infants through perinatal transmission. It has been estimated that if such programs screened 90% of pregnant women across Canada, there would be a 65% reduction in the number of HIV-infected infants (compared with no prenatal testing and assuming that 24% of untreated pregnancies and 6% of treated pregnancies result in HIV-infected infants).[19]

Comment

CIDPC has estimated that about 15,800 Canadians are HIV infected but unaware of their infection.[20] The proportion of positive HIV test reports in Canada attributed to women is on the rise. As a result, as more women become infected with HIV, the risk of perinatal transmission will increase. Given this and the fact that perinatal infections are preventable, it is important that all pregnant women, and women considering pregnancy, have access to prenatal care that includes the offer of HIV testing as well as appropriate counselling and care.

References

1. World Health Organization. *Mother-to-child transmission of HIV*. URL: <http://www.who.int/reproductive-health/stis/mtct/index.htm>. Accessed April 24, 2006.
2. Public Health Agency of Canada. *HIV and AIDS in Canada: surveillance report to December 31, 2005*. Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, 2006.
3. Ogilvie G, Krajden M, Patrick DM et al. *Antenatal seroprevalence of HIV in British Columbia*. Can J Infect Dis Med Microbiol 2006;17(Suppl A):53A.
4. Jayaraman GC, Larke B, Preiksaitis J. *Mandatory reporting of HIV infection and opt-out prenatal screening for HIV infection: effect on testing rates*. Can Med Assoc J 2003;168(6);679-82.
5. Blanchard J et al. *Manitoba antenatal study*. Report submitted to the Laboratory Centre for Disease Control, Health Canada, June 1996.
6. Remis RS. *Tables of prenatal HIV testing in Ontario: January 1999 to December 2005*. URL: <http://www.phs.utoronto.ca/ohemu/doc/2005/Web%20Summary2005_Q4.pdf>. Accessed April 20, 2006.
7. Hankins D, Laberge C, Lapointe N et al. *HIV infections among Quebec women giving birth to live infants*. Can Med Assoc J 1991;144(3): 277-80.
8. Remis RS, King SM, Vernich L et al. *Epidemiologic modeling to evaluate prevention of mother-infant HIV transmission in Ontario*. J Acquir Immune Defic Syndr 2003;34(2); 221-30.
9. Boucher M, Samson J, Lapointe N. *HIV screening among pregnant women in the province of Quebec: success and failure*. Can J Infect Dis 2002;13(suppl A):30A(Abstract 223).
10. Bitnun A, King SN, Arneson C et al. *Failure to prevent perinatal HIV infection*. Can Med Assoc J 2002;166(7);904-5.
11. Yudin M, Moravac C, Shah R. *HIV screening in pregnancy: testing acceptance rates are influenced by strategy used (opt-in vs opt-out) and patient race*. Can J Infect Dis Med Microbiol 2006;17(A):53A-54A.
12. Santé et Services sociaux, Québec. *Surveillance des maladies à déclaration obligatoire au Québec. Rapport annuel 2002*. Février 2005. URL : <http://publications.msss.gouv.qc.ca/acrobat/f/documentation/2005/05-268-02W.pdf>. Accessed April 21, 2006.
13. Conner EM, Sperling RS, Gelber R et al. *Reduction of maternal-infant transmission of human immunodeficiency virus type 1 with zidovudine treatment*. Pediatric AIDS Clinical Trials Group Protocol 076 Study Group. N Engl J Med 1994;331(18):1173-80.
14. U.S. Department of Health and Human Services. *Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents*. October 6, 2005. URL: <http://aidsinfo.nih.gov/Guidelines/GuidelineDetail.aspx?MenuItem=Guidelines&Search=Off&GuidelineID=7&ClassID=1>. Accessed April 24, 2006.
15. Forbes J, Samson L, Alimenti A et al. *Perinatal HIV transmission seen in the Canadian Perinatal HIV Surveillance Project (CPHSP) from 1990*. Can J Inf Dis Med Microbiol 2006; 17(Suppl A):41A-42A.
16. CPARG. *Antiretroviral therapy in pregnant women. Access and outcome (1995-1997) and the experience of transmission of HIV in treated pregnant women at Ste. Justine's Clinic, Quebec*. Presentation by Lapointe N, Proceedings of a Scientific Meeting to Review

the Vertical transmission of HIV in Canada, June 1998.

17. Forbes JC, Money DM, Temple PV et al. *Effect of antiretroviral use on HIV vertical transmission rate and injection drug use on adherence in British Columbia, Canada*. Can J Infect Dis 2000;11:46B(Abstract 246P).

18. Robinson JL, Bonita EL. *Prevention of perinatal transmission of HIV infection.* Can Med Assoc J 2000;163(7):831-32.

19. Archibald CP, Farley J, Yan P et al. *Estimating the impact of antenatal HIV testing in Canada: a lesson on the difference between efficacy and effectiveness*. Can J Infect Dis 1999;10:43B(Abstract C304).

20. Boulos D, Yan P, Schanzer D, Remis RS and Archibald C. *Estimates of HIV prevalence and incidence in Canada, 2005.* Can Commun Dis Rep 2006; 32(15):165-174.

Acknowledgements

National level HIV and AIDS surveillance is possible as a result of all provinces and territories participating in, and setting directions for, HIV and AIDS surveillance. CIDPC acknowledges the provincial/territorial HIV/AIDS coordinators, public health units, laboratories, health care providers, and reporting physicians for sharing non-nominal, confidential data for national surveillance.

For more information, please contact:

Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture
Postal locator: 0602B
Ottawa, ON K1A 0K9
Tel: (613) 954-5169
Fax: (613) 957-2842
www.phac-aspc.gc.ca

Mission
To promote and protect the health of Canadians through leadership, partnership, innovation and action in public health.
Public Health Agency of Canada

This page has been intentionally left blank.

Public Health
Agency of Canada
Agence de santé
publique du Canada

Canada

HIV/AIDS

Epi Update

Centre for Infectious Disease Prevention and Control

HIV/AIDS Among Aboriginal Peoples in Canada: A Continuing Concern

At a Glance

- **Aboriginal people remain over-represented in the HIV/AIDS epidemic in Canada.**
- **Among Aboriginal Canadians, the proportion of new HIV infections in 2005 attributed to IDU (53%) was much higher than among all Canadians (14%).**
- **HIV/AIDS has a significant impact on Aboriginal women. During 1998-2005, women represented 47.3% of all positive HIV test reports among Aboriginal peoples as compared with 20.5% of reports among non-Aboriginal peoples.**
- **Aboriginal peoples receive a diagnosis of HIV at a younger age than non-Aboriginal peoples. A third (32.2%) of new positive HIV test reports among Aboriginal persons represent youth (aged < 30 years) as compared with 20.8% among non-Aboriginal persons.**

Introduction

In Canada, Aboriginal populations are very diverse, with communities (First Nations, Inuit, and Métis) that reflect variations in historical backgrounds, language, and cultural traditions. Unfortunately, these communities are disproportionately affected by many social, economic, and behavioural factors such as high rates of poverty, substance abuse, sexually transmitted infections, and limited access to, or use of, health care services, all of which increase their vulnerability to HIV infection.

An adequate description of the HIV/AIDS epidemic among Aboriginal peoples in Canada requires accurate and complete access to ethnicity data about AIDS cases and positive HIV test reports. With respect to ethnicity data on AIDS cases, 79.7% of all AIDS cases reported between 1979 and December 31, 2005, contain these data. For positive HIV test reports, ethnicity data are reported for 29.1% of records and are not available for all provinces and territories. Provinces and territories that report ethnic information are British Columbia, Yukon Territory, Alberta, Northwest Territories, Nunavut, Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. As a result, only data from these provinces and territories are used when examining data on Aboriginal peoples.

In provinces/territories that provide ethnic information with positive HIV test reports, Aboriginal communities make up 6.0% of the population overall, with concentrations in the Territories[1] (Yukon, Northwest Territories, and Nunavut 22.9%, 50.5%, and 85.4% of the respective populations) and other western provinces,[1] such as Saskatchewan (13.5%) and Manitoba (13.6%). Fortunately, ethnic information on positive HIV test reports is well reported for all of these provinces.

CIDPC Website:

www.phac-aspc.gc.ca/hast-vsmt/

This report updates current information on the status of the HIV/AIDS epidemic among Aboriginal peoples in Canada. To summarize Canadian HIV and AIDS surveillance data, Aboriginal peoples are identified as First Nations, Inuit, and Métis. The category *Aboriginal Unspecified* is also used if no further details are known.

National HIV and AIDS surveillance data that appear in this document are from both (a) *HIV and AIDS in Canada. Surveillance report to December 31, 2005*[2] and (b) unpublished data, from the Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control (CIDPC), Public Health Agency of Canada.

Aboriginal Peoples Make Up a Growing Percentage of HIV Reports and AIDS Cases

A steady rise has been seen in the proportion of reported AIDS cases and positive HIV test reports among Aboriginal peoples in Canada in recent years.

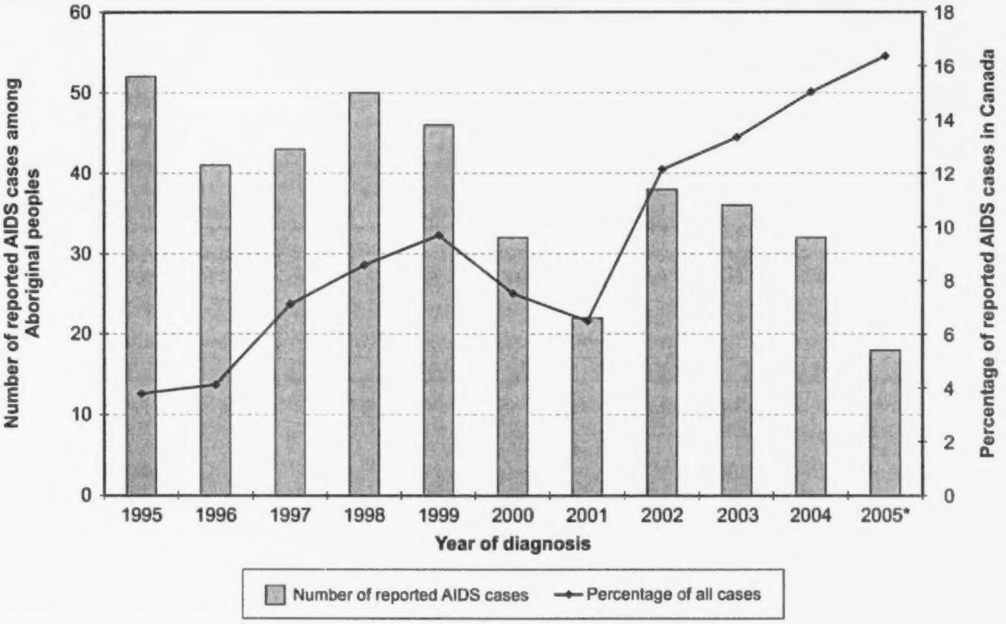
AIDS Surveillance Data

Between 1979 and December 31, 2005, there were 20,353 AIDS cases reported to CIDPC. Of these, 16,213 (79.7%) included information on ethnicity, of which 573 were reported to be Aboriginal people (3.5%).

In 2005, ethnicity data were available for 39% of AIDS cases. This decline in data completeness was in part due to an information technology application change in the province of Ontario, where information on ethnicity and exposure category was not available for AIDS cases reported in the second half of 2005. When interpreting data for 2005, caution must be used because of small numbers.

Before 1995, out of the 10,510 reported AIDS cases with information on ethnicity, 163 cases or 1.6% were Aboriginal. This proportion steadily increased until it reached a high of 9.7% in 1999. In 2002, the proportion increased to 12.1%, and by 2005 a further increase was seen, when Aboriginal peoples accounted for 16.4% of the total reported AIDS cases for which ethnicity was known (Figure 1).

Figure 1. Reported AIDS cases in the Aboriginal community of Canada



---

* Quebec AIDS data have not been available since June 30, 2003, and Ontario AIDS data by exposure category and ethnicity were not available for the second half of 2005.

HIV Surveillance Data

Between 1998 and the end of December 2005, there were 18,872 positive HIV tests reported to CIDPC, 5,501 of which contained information on ethnicity (29.1%). Of these 5,501, there were 1,250 reported positive tests of Aboriginal peoples (22.7%). As ethnicity data for positive HIV test reports have only been available since 1998, comparisons are only possible for this limited period of time.

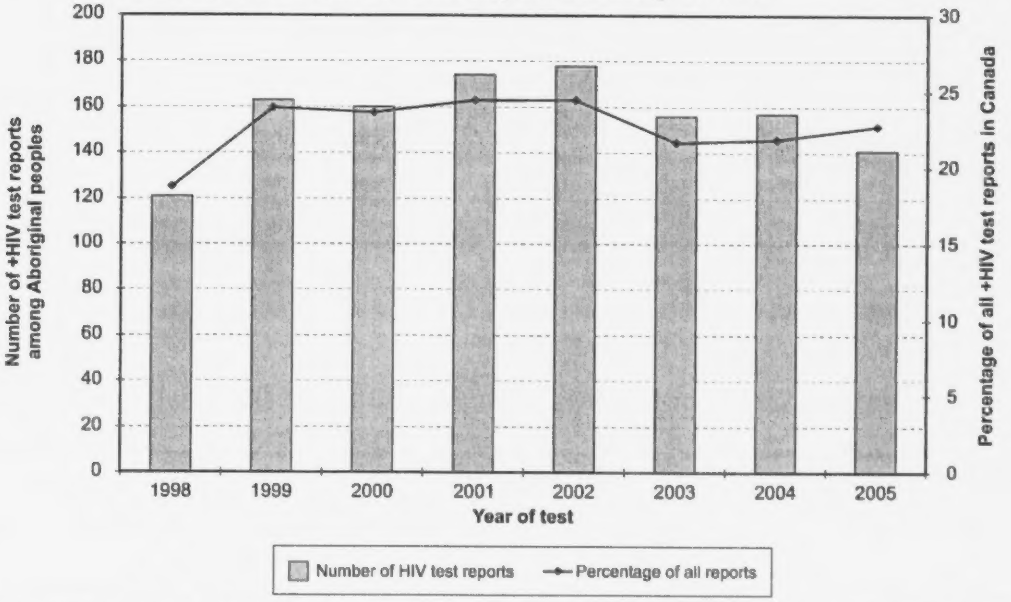
Figure 2 shows that since 1998, the proportion of positive HIV test reports attributed to Aboriginal peoples has remained steady, at just over 20%. From provinces and territories with ethnicity reporting, of the 645 positive HIV tests reported in 1998 there were 121 among Aboriginal peoples, representing 18.8% of such tests reported in that period. This proportion peaked at 24.5% (178/728) in 2002. Since that time, the proportion of positive HIV test reports attributed to Aboriginal peoples has remained around 22%.

Injecting Drug Use Continues to Be a Key Mode of Transmission in the Aboriginal Community

Injecting drug users (IDU) continue to be an important risk group in the Canadian HIV epidemic. Recent evidence supports the trends seen in surveillance data suggesting that injecting drug use is a particularly important risk factor for HIV and AIDS among Aboriginal peoples.

As Table 1 indicates, there are notable differences between Aboriginal and non-Aboriginal reported AIDS cases and positive HIV test reports with respect to exposure category. Although the proportion attributed to heterosexual exposure[†] is similar, Aboriginal peoples have a higher proportion of reports attributed to IDU and a smaller proportion to MSM.

Figure 2. Positive HIV Test Reports in the Aboriginal Community in Canada for Provinces and Territories that Report Ethnicity for HIV



The provinces and territories that report ethnicity with positive HIV test reports are British Columbia, Yukon Territory, Alberta, Northwest Territories, Nunavut, Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador

---

[†] The heterosexual exposure category includes people born in a country where HIV is endemic, people who report heterosexual contact with a person who is either HIV-infected or at increased risk of HIV infection, and people who report heterosexual contact as the only risk factor.

Table 1. Comparison of selected exposure categories for reported AIDS cases and positive HIV* test reports among Aboriginal and non-Aboriginal peoples

	Aboriginal	Non-Aboriginal
	n = number of cases with available information on exposure category	
AIDS **1979 – 2005**	***n* = 547**	***n* = 15,190**
IDU	39.5%	6.9%
MSM	31.4%	69.3%
Heterosexual	18.8%	15.4%
HIV **1998 – 2005**	***n* = 1,207**	***n* = 4,099**
IDU	58.9%	25.7%
MSM	6.6%	38.7%
Heterosexual	29.3%	30.9%

IDU = injecting drug users, MSM = men who have sex with men

*For positive HIV test reports, the data are from provinces/territories with reported ethnicity (BC, YT, AB, NT, NU, SK, MB, NB, NS, PEI, NL).

AIDS Surveillance Data

- Of reported AIDS cases with known exposure, the proportion of Aboriginal cases attributed to injecting drug use has dramatically increased over time, from 18.0 % before 1995 to 47.0% during 1995-2000 and 51.2% during 2000-2005.

- Of the 547 reported AIDS cases with known exposure category among Aboriginal peoples between 1979 and December 31, 2005, there were 407 male cases and 139 female cases (information on gender missing for one case). Figures 3a and 3b display how these cases were distributed by exposure category.

HIV Surveillance Data

- The monitoring of positive HIV test reports between 1998 and 2005 also shows that injecting drug use was the most common route of transmission among Aboriginal peoples. Of the Aboriginal reports with exposure category information, 58.9% were attributed to injecting drug use.

- Of the 1,207 positive HIV test reports with known exposure category reported among Aboriginal peoples between 1979 and December 31, 2005, there were 637 male cases and 567 female cases (information on gender missing for three cases). Figure 3c displays how reports among males are distributed by exposure category. Of female reports (summarized in Figure 3d), 64.6 % were attributed to IDU and 33.9% to heterosexual exposure, proportions similar to those for reported AIDS cases.

Data from Targeted Studies

- Aboriginal people are over-represented in the IDU population and are at even higher risk than other members of this high-risk population.

- Results from Phase I of the I-Track survey (Surveillance and Risk Assessment Division, CIDPC, unpublished data, 2006) showed that 41.9% of the study participants identified themselves as being of Aboriginal ethnic background. Most of these were from Regina, where 87.2% of the study population was Aboriginal, followed by Edmonton at 70.3% and Winnipeg at 69.6%. The proportion of Aboriginal IDU in the remaining study population ranged from 5.5%

Figure 3a. Distribution of exposure categories among reported AIDS cases of Aboriginal males (*n* = 407), November 1979-December 31, 2005

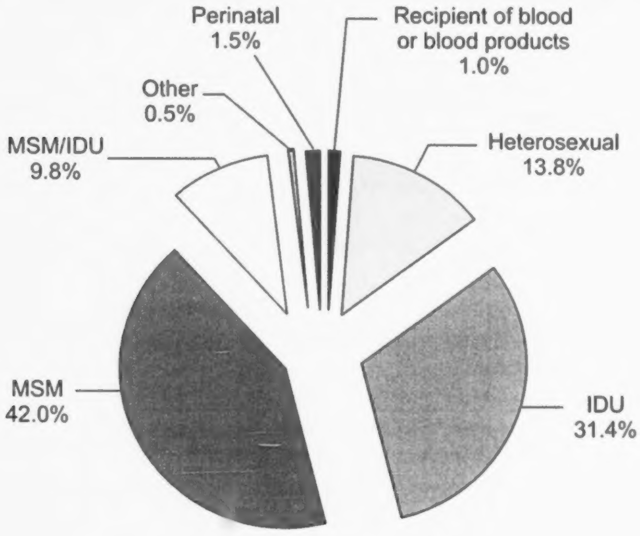
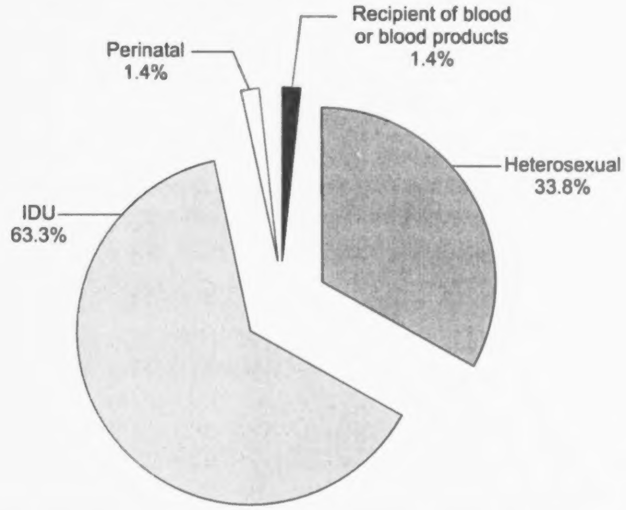


Figure 3b. Distribution of exposure categories among reported AIDS cases of Aboriginal females (*n* = 139), November 1979-December 31, 2005



among the SurvUDI participants in Quebec to 27.3% in Sudbury.

A 2000 study of IDU in Regina indicated that of the 255 participants, 90% identified themselves as an Aboriginal person.[3]

In a study of Calgary's Needle Exchange Program, most participants were White (75%), but Aboriginal persons were the second highest ethnic group, representing 20% of total participants.[4]

In Vancouver, the prevalence of HIV among Aboriginal IDU was considerably higher than among their non-Aboriginal counterparts, and half of the Aboriginal drug user population were women, which was considerably higher than in the non-Aboriginal population.[5]

Figure 3c. Distribution of exposure categories among positive HIV test reports of Aboriginal males (*n* = 637), January 1998-December 31, 2005

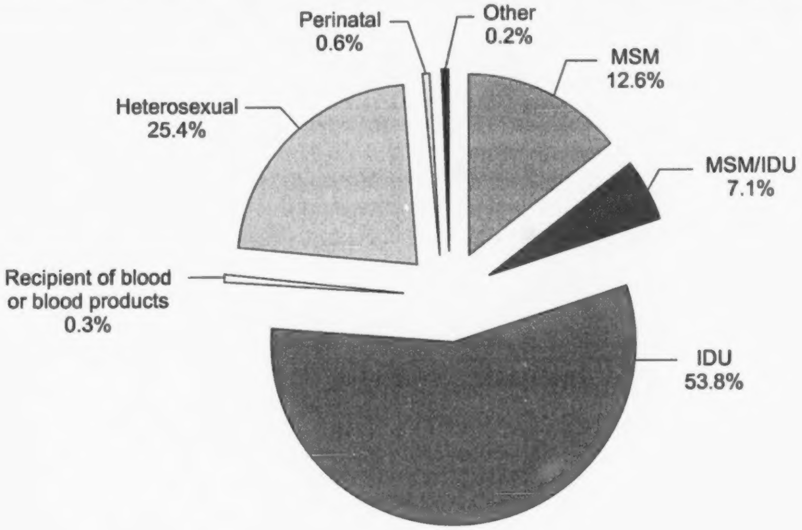
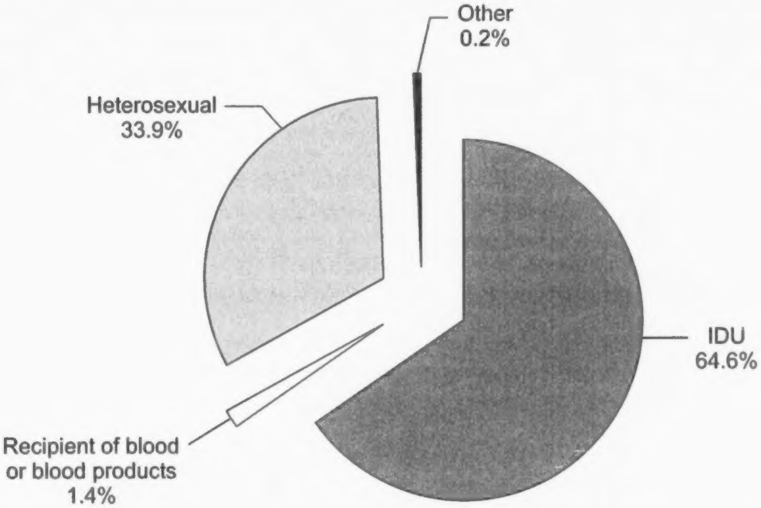


Figure 3d. Distribution of exposure categories among positive HIV test reports of Aboriginal females (*n* = 567), January 1998-December 31, 2005



The Vancouver Injection Drug Users Study (VIDUS) is an open cohort of IDU. Of the 1,400 recruited between May 1996 and May 2000, 25% of participants were Aboriginal persons, more than half of whom were female (54% female, 46% male). In contrast, females accounted for 29% of non-Aboriginal participants.[6]

In a further analysis of the VIDUS study, investigators found that Aboriginal status was significantly associated with new HIV infection in both men and women[7] and also in study participants 24 years of age or younger.[8]

VIDUS reported that, as of December 2001, 19.1% of Aboriginal participants had seroconverted compared with 9.6% of persons who identified themselves as non-Aboriginal.[9] In a 2003 publication, investigators concluded that, in Vancouver, Aboriginal IDU were becoming HIV positive at twice the rate of non-Aboriginal IDU.[5]

Of 910 MSM surveyed in Vancouver between 1995 and 2000, 106 (12%) had injected drugs in the previous year. MSM/IDU were younger than MSM and more likely to be HIV-seropositive, Aboriginal, economically disadvantaged, engaged in the trade of sex for money and drugs, and to report having female partners.[10]

HIV/AIDS Has a Significant Impact on Aboriginal Women

- In contrast to HIV and AIDS cases in the non-Aboriginal population, females make up a comparatively large part of the Aboriginal HIV epidemic. Table 2 shows the distribution of gender in positive HIV test reports and reported AIDS cases for Aboriginal and non-Aboriginal peoples. Females represent 47.3% of all positive HIV test reports among Aboriginal peoples, as compared with 20.5% of reports among non-Aboriginal peoples.

AIDS Surveillance Data

- Before 1995, females represented 12.3% of reported AIDS cases among Aboriginal peoples (20/163), yet by 2005 the proportion had increased to 38.9% (7/18).

HIV Surveillance Data

- Among Aboriginal peoples, the proportion of positive HIV test reports attributed to females peaked in 2005 at 60.0% (84/140).

Data from Targeted Studies

Pregnant women infected with HIV are at risk of transmitting the virus to their unborn child. Data from some sites in western Canada have shown that a high proportion of HIV-infected pregnant women who deliver are Aboriginal. Of all pediatric centres across Canada where children and HIV-infected mothers were followed between 1995 and 1997, 19% of the women seen (49/259) were Aboriginal women.[11] Of 32 HIV-infected women who delivered in northern Alberta or the Northwest Territories in 1996-98, 29 (91%) were Aboriginal.[12]

In a prenatal HIV screening program study conducted in Alberta of 38,712 pregnant women, 36,163 (93.4%) were non-First Nations and 2,549 (6.6%) were First Nations. A total of 593 (1.5%) pregnant women declined HIV testing: 538 (1.5%) of all non-First Nations women and 55 (2.2%) of all First Nations women. Overall, the pregnant women of First Nations were on average about twice as likely to decline HIV testing as non-First Nations pregnant women, particularly when they were under the care of male practitioners.[13]

Despite high numbers of Aboriginal women seen at HIV clinics and pediatric centres, there was encouraging news that during the period 1995 to 1997, pregnant Aboriginal women were as likely to be taking antiretroviral therapy (62%) as pregnant White women (66%) and pregnant Black women (63%).[14]

In a 2001 study of antiretroviral therapy in a cohort of HIV-positive pregnant women

Table 2. Comparison of gender of reported AIDS cases and positive HIV* test reports among Aboriginal and non-Aboriginal Peoples

	Aboriginal	Non-Aboriginal
	n = number of cases with available information on gender	
AIDS (1979-2005)	***n* = 572**	***n* = 15,636**
Female	25.7%	9.0%
HIV (1998-2005)	***n* = 1,246**	***n* = 4,242**
Female	47.3%	20.5%

*For positive HIV test reports, the data are from provinces/territories with reported ethnicity (BC, YT, AB, NT, NU, SK, MB, NB, NS, PEI, NL).

recruited at seven sites in Ontario, Manitoba, and Saskatchewan, the results show that 20% of women were Aboriginal. Late use of antiretroviral therapy (in third trimester or intrapartum) was unequally distributed by ethnic status, occurring in 38% of Aboriginal, 27% of Black and 9% of White women.[15]

Of the infants known to have contracted HIV through perinatal transmission in British Columbia between 1994 and 1999, 50% were Aboriginal.[16]

A 3-year study (2000-2003) was conducted in British Columbia by the Chief's Health Committee of the First Nations Summit in partnership with Health Canada and the Canadian Blood Services, during which blood samples were taken from 5,242 pregnant Aboriginal women. A total of 15 tested positive for HIV for a prevalence rate of approximately 30 per 10,000.[17] This is about three times higher than the rate of 9 per 10,000 seen in a study of the general population of women in BC who had prenatal testing during 2003.[18]

Aboriginal Peoples are Receiving a Diagnosis of HIV at a Younger Age than Non-Aboriginal Peoples

HIV and AIDS among young people in Aboriginal communities is an increasing concern. Understanding the epidemic in this group will help to target early intervention strategies appropriately; however, it is important that caution be used when reviewing proportions by age group, as they can change considerably with the addition of only a few cases, particularly when total numbers are small, such as with youth (aged less than 30 years).

As indicated in Table 3, among new positive HIV test reports and reported AIDS diagnoses, Aboriginal cases are younger than non-Aboriginal cases.

AIDS Surveillance Data

MSM and IDU each accounts for approximately a third of reported AIDS cases among Aboriginal youth. IDU makes up the

Table 3. Comparison of age at time of diagnosis for reported AIDS cases and at time of test for positive HIV* test reports among Aboriginal and non-Aboriginal peoples

	Aboriginal	Non-Aboriginal
	n = number of cases with available information on age	
AIDS (1979-December 31, 2005)	***n* = 573**	***n* = 15,637**
< 20 years	1.6%	1.5%
20-29 years	20.1%	14.5%
30-39 years	47.1%	43.6%
40-49 years	23.7%	28.5%
50+ years	7.5%	11.9%
HIV (1998-December 31, 2005)	***n* = 1,249**	***n* = 4,241**
< 20 years	4.4%	1.4%
20-29 years	27.8%	19.4%
30-39 years	37.9%	37.7%
40-49 years	23.6%	27.3%
50+ years	6.3%	14.3%

*For positive HIV test reports, the data are from provinces/territories with reported ethnicity (BC, YT, AB, NT, NU, SK, MB, NB, NS, PEI, NL).

largest proportion, at 33.9% (41/121), followed closely by MSM at 30.6% (37/121). The data considered here are from the period 1979 to 2005.

HIV Surveillance Data

There has been an increase in the proportion of positive HIV tests among individuals in this age group. Youth accounted for 34.7% (42/121) of positive HIV test reports among Aboriginal peoples in 1998, as compared with 41.2% (58/141) of positive test reports in 2005.

Note that IDU make up 59.5% (201/338) of positive HIV test reports among youth, followed by the heterosexual exposure category at 7.5% (93/338) and MSM at 7.4% (25/338). The data considered here are taken from the period 1998 to 2005.

Data from Targeted Studies

A study of risk factors among 232 young (less than 25 years) IDU in Vancouver found that 9 of 16 (56%) of the incident cases were Aboriginal.[9]

The Cedar Project is an observational study of Aboriginal youth living in Vancouver and Prince George, B.C. Eligibility criteria include age 14-30 and self-reported use of non-injection or injection drugs at least once in the month prior to enrolment. A total of 543 participants were recruited between September 2003 and July 2005, and of these 300 resided in Vancouver and 243 lived in Prince George. At enrolment 400 participants (74%) reported having had an HIV test during their lifetime, of whom 183 (46%) were tested regularly. Overall 46 (8%) of 543 participants tested HIV positive. The findings of this study are significant in that they may be used by policy makers to design and implement culturally appropriate HIV testing programs for this high-risk population.[19]

HIV/AIDS Surveillance Data in Canada's Three Aboriginal Communities

When compared with a non-Aboriginal community, the number of positive HIV test reports and reported AIDS cases in Aboriginal communities may appear small; however, it is important to understand that these are individuals, and every new diagnosis has a significant impact on the Aboriginal community. Caution should be used when reviewing community proportions, as they can change considerably with the addition of only a few cases, particularly when total numbers are small.

AIDS Surveillance Data

According to the 2001 Census, 62% of Aboriginal Canadians are First Nations, 30% are Métis, 5% are Inuit, and another 3% are from multiple communities.[1] Of 573 Aboriginal AIDS cases reported to December 31, 2005, 73.6% or 422 were First Nations, 7.2% or 41 were Métis, 3.8% or 22 were Inuit, and 15.4% or 88 were in the category Aboriginal Unspecified.

The data on reported AIDS cases in terms of IDU, females, and youth in specific Aboriginal communities and in the Aboriginal Unspecified category are summarized below. Further details regarding gender and selected age and exposure category distribution are shown in Table 4.

First Nations: Of reported AIDS cases among First Nations people 44.9% of cases can be attributed to injecting drug use (179/399). Females represent 27.6% (116/421) of cases, and youth (< 30 years) account for 21.1% (89/422) of all First Nations cases.

Métis: In the Métis community, 30.0% (12/40) of all reported AIDS cases are attributable to IDU, and few cases are female (3/41 or 7.3 %). It is important to note that nearly 31.7% (13/41) of reported AIDS cases among the Métis occur in those under 30 years of age.

Inuit: The IDU exposure category represents about a third of reported AIDS cases among Inuit people, at 31.8% (7/22). A notable proportion of cases occur in females (9/22 or 40.9%), and youth (less than 30 years) represent 31.8% (7/22) of cases.

Table 4. Gender, and selected age and exposure categories of reported AIDS cases in Aboriginal groups in Canada between 1979 and December 31, 2005

	First Nations	Inuit	Métis	Aboriginal, unspecified
	n = number of cases with available information			
Gender	***n* = 421**	***n* = 22**	***n* = 41**	***n* = 88**
Female	27.6%	40.9%	7.3%	21.6%
Age (years)	***n* = 422**	***n* = 22**	***n* = 41**	***n* = 88**
< 20 years	1.4%	0.0%	2.4%	2.3%
20-29 years	19.7%	31.8%	29.3%	14.8%
30-39 years	46.9%	54.5%	43.9%	47.7%
40-49 years	23.5%	9.1%	22.0%	29.5%
Exposure category	***n* = 399**	***n* = 22**	***n* = 40**	***n* = 86**
MSM	28.1%	27.3%	50.0%	39.5%
IDU	44.9%	31.8%	30.0%	20.9%
Heterosexual	16.8%	31.8%	10.0%	29.1%

Aboriginal Unspecified: IDU account for 20.9% (18/86) of cases for which the Aboriginal community is unspecified. Females make up just over 21.6% of cases (19/88) and youth (less than 30 years) 16.9% of cases in this group (15/88).

Proportion of Aboriginal Peoples among Estimated HIV Prevalent and Incident Infections at the National Level

National HIV surveillance data may understate the magnitude of the HIV epidemic because such data are subject to reporting delays, underreporting, and changing patterns in HIV testing behaviours (those who come forward for testing); surveillance data also do not include individuals who remain untested and undiagnosed. Since HIV is a chronic infection with a long incubation period, many newly infected persons may only be diagnosed in the years after infection. Consequently, the number of new HIV positive tests reported to CIDPC in a given year does not estimate the new HIV infections that occurred in that year because many will have been infected in earlier years.

Since surveillance data can only describe the diagnosed portion of the epidemic, modelling and additional sources of information are required to describe the epidemic among Canadians with both diagnosed and undiagnosed infection. The methods used to estimate the total number of people living with HIV (prevalence) and the number newly infected with HIV (incidence) at the national level bring together all available data, including national HIV surveillance data.

- Aboriginal persons continue to be overrepresented in the HIV epidemic in Canada. They represent 3.3% of the Canadian population,[1] and yet an estimated 3,600 to 5,100 Aboriginal peoples were living with HIV (including AIDS) in Canada in 2005, representing about 7.5% of all prevalent HIV infections.[20] This is higher than the estimated number of 3,100-4,400 for 2002 but represents the same proportion (7.5%).

- Aboriginal persons accounted for approximately 200 to 400 of the new HIV infections in 2002 and 2005, which is about 9% of the total for 2005 and 10% for 2002. Therefore, the overall infection rate among Aboriginal persons is about 2.8 times

Table 5. Distribution of exposure category for estimated prevalent and incident HIV infections among Aboriginal peoples in Canada, 2005

Exposure category	Prevalent infections (*N* = 3,600-5,100)	Incident infections (*N* = 200-400)
IDU	56%	53%
Heterosexual contact	26%	33%
MSM	11%	10%
MSM/IDU	6%	3%

higher than among non-Aboriginal persons.[20]

- The estimated distribution of exposure category of prevalent and incident infections among Aboriginal persons in 2005 is indicated in Table 5. The proportion of new HIV infections in 2005 due to IDU among Aboriginal Canadians (53%) is much higher than among all Canadians (14%).[20] This highlights the uniqueness of the HIV epidemic among Aboriginal persons and underscores the complexity of Canada's HIV epidemic.

Comment

Aboriginal HIV and AIDS surveillance data are incomplete for several reasons. The primary one is the incomplete information on ethnicity in current surveillance data. Since 1979, 20.3% of all reported AIDS cases have no information on ethnicity. Ethnicity data for positive HIV test reports have only been available since 1998. Furthermore, 70.9% of positive HIV test reports between 1998 and 2005 lack these data. Other reasons include interprovincial variations in reporting ethnicity, misclassification of ethnic status, and delays in reporting. Positive HIV test reports and reported AIDS cases represent only those infected individuals who came forward for testing or who received an AIDS diagnosis and were subsequently reported to Health Canada. As a result, the surveillance numbers in this report do not represent the total number of Aboriginal peoples who are infected with HIV or whose AIDS has been diagnosed.

Despite these limitations, evidence suggests that the HIV epidemic in the Aboriginal community shows no sign of abating. Injecting drug use is currently the most common mode of HIV transmission among Aboriginal peoples, Aboriginal women make up a large part of the HIV epidemic in their community, and Aboriginal peoples appear to be infected at a younger age than non-Aboriginals. This indicates the different characteristics of the HIV epidemic among Aboriginal peoples and emphasizes the complexity of Canada's HIV epidemic. Better data on HIV/AIDS epidemiology and HIV testing among Aboriginal peoples in Canada are needed to guide prevention and control strategies. In addition, it is vital to conduct further research to increase our understanding of the specific impact HIV has on Aboriginal peoples.

References

1. Statistics Canada. *Population by Aboriginal group. 2001 Census, Canada, provinces and territories*. URL: <http://www.statcan.ca/english/Pgdb/popula.htm#ori>.
2. Public Health Agency of Canada. *HIV and AIDS in Canada. Surveillance report to December 31, 2005*. Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, 2005. URL: <http://www.phac-aspc.gc.ca/publicat/aids-sida/haic-vsac0604/index.html>.
3. Findlater R, Young, Bangura H et al. *The Regina Seroprevalence Study: a profile of injection drug use in a prairie city*, 2000. Unpublished report. Available through the

Surveillance and Risk Assessment Division, Health Canada.

4. Guenter CD, Fonseca K, Nielsen DM et al. *HIV prevalence remains low among Calgary's needle exchange program participants.* Can J Public Health 2000;(91)2:129-32.

5. Craib JP, Spittal PM, Wood Evan et al. *Risk factors for elevated HIV incidence among Aboriginal injection drug users in Vancouver.* Can Med Assoc J 2003;168(1):19-24.

6. Tyndall MW, Craib KJP, Currie S et al. *Impact of HIV infection on mortality in a cohort of injection drug users.* J Acquir Immune Defic Syndr 2001;(28)4:351-57.

7. Spittal PM, Craib KJP, Wood E et al. *Risk factors for elevated HIV incidence rates among female injection drug users in Vancouver.* Can Med Assoc J 2002;166:894-99.

8. Miller CL, Tyndall M, Spittal P et al. *HIV incidence and associated risk factors among young injection drug users.* AIDS 2002;(16)3:491-93.

9. Craib KIP, Spittal PM, Li K et al. *Comparison of HIV incidence rates among aboriginal and non-aboriginal participants in a cohort of injection drug users in Vancouver.* Can J Infect Dis 2002;13(Suppl A):48A(Abstract 315).

10. O'Connell J, Lampinen TM, Weber AE et al. *Sexual risk profile of young men in Vancouver, British Columbia, who have sex with men and inject drugs.* AIDS Behav 2004;8(1):17-23.

11. Forbes JC, Burdge DR, Money D. *Pregnancy outcome in HIV infected women in British Columbia: the impact of antiretroviral therapy on maternal-infant HIV transmission.* Can J Infect Dis 1997;8:31A(Abstract 235).

12. Birse E, Shokoples S, Houston S. *Demographic and clinical features of Aboriginal and non-Aboriginal patients with HIV infection in Northern Alberta.* Can J Infect Dis 1999;10(Suppl B):66B(Abstract C387P).

13. Wang FL, Larke B, Gabos S et al. *Potential factors that may affect acceptance of routine prenatal HIV testing.* Can J Public Health 2005;96(1):60-4.

14. Lapointe N, Forbes J, Singer J et al. *Antiretroviral therapy in pregnant women in Canada: access and outcome 1995-97.* Can J Infect Dis 1998;9(Suppl A):70A(Abstract 449P).

15. King SM and the Motherisk-HIV Network Members. *Antiretroviral therapy (ART) in a cohort of HIV-positive pregnant women in Canada.* Can J Infect Dis 2001;12(Suppl B):26B(Abstract 203).

16. Ogilvie G, Money D, Forbes J et al. *Perinatal infection in Aboriginal maternal infant pairs (MIP) in British Columbia.* Can J Infect Dis 2002;13(Suppl A):50A(Abstract 321).

17. Jin A. *Final cumulative progress report: Jul 1, 2000 to September 14, 2003. Anonymous unlinked seroprevalence survey of human immunodeficiency virus and human T-lymphotropic viruses type I and II among pregnant Status Indian women in British Columbia, January 23, 2004.*

18. Ogilvie G, Krajden M, Patrick DM et al. *Antenatal seroprevalence of HIV in British Columbia.* Can J Infect Dis Med Microbiol 2006;17(Suppl A):(Abstract 342P).

19. Moniruzzaman A, KJP Craib, MT Schecter et al. *The Cedar Project: BC Centre for Excellence in HIV/AIDS.* Can J Infect Dis Med Microbiol 2006;17(Suppl A):(Abstract 303).

20. Boulos D, Yan P, Schanzer D et al. *Estimates of HIV prevalence and incidence in Canada, 2005.* CCDR 2006;32(15) (in press).

Acknowledgements

National level HIV and AIDS surveillance is possible as a result of all provinces and territories participating in, and setting directions for, HIV and AIDS surveillance. CIDPC acknowledges the provincial/territorial HIV/AIDS coordinators, public health units, laboratories, health care providers, and reporting physicians for sharing non-nominal, confidential data for national surveillance.

For more information, please contact:

Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture
Postal locator: 0602B
Ottawa, ON K1A 0K9
Tel: (613) 954-5169
Fax: (613) 957-2842
www.phac-aspc.gc.ca

Mission
To promote and protect the health of Canadians through leadership, partnership, innovation and action in public health.
Public Health Agency of Canada

This page has been intentionally left blank.

HIV/AIDS
Epi Update
Centre for Infectious Disease Prevention and Control

HIV Infections Among MSM in Canada

Introduction

In Canada, the HIV/AIDS epidemic has had a tremendous impact on men who have sex with men (MSM). Even though the toll of the epidemic no longer affects them to the same extent as in the early to mid-1980s, this group still accounts for the largest number of reported HIV and AIDS diagnoses. Recent data on HIV incidence and risk behaviours suggest that MSM continue to be at risk of HIV infection and other sexually transmitted infections (STIs). This report updates the current information on the status of HIV and AIDS among MSM in Canada.

AIDS Surveillance Data

- As of December 31, 2005, the Centre for Infectious Disease Prevention and Control (CIDPC) reported a cumulative total of 20,353 AIDS cases. Of the 18,324 adult male AIDS cases, 76.3% were attributed to MSM and an additional 4.7% were attributed to the MSM who also reported injecting drugs (MSM/IDU).[1]
- Of AIDS cases reported to CIDPC there has been a steady decrease in the proportion of adult male cases attributed to MSM. Before 2000, the MSM exposure category accounted for 78.6% of adult male AIDS cases, and this had decreased to 44.1% in 2003. In 2004, the proportion remained fairly steady at 45.1%, and in 2005 it increased slightly to 48%.[1]
- The proportion of reported adult male AIDS cases attributed to MSM/IDU has remained relatively steady, varying between 2.8% and 6.4% during the last 5 years.[1]

At a Glance

- **In Canada, MSM account for 76.3% of cumulative reported AIDS cases and 68.8% of cumulative positive HIV test reports among adult males.**
- **MSM were estimated to account for 45% of all new HIV infections in Canada in 2005.**
- **The estimated number of new infections among MSM in 2005 has not decreased and may have increased slightly compared to 2002.**

CIDPC Website:

www.phac-aspc.gc.ca/hast-vsmt/

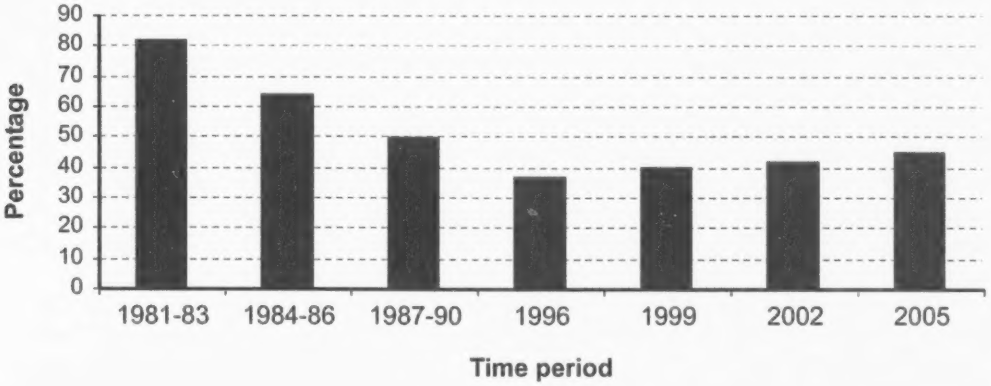
HIV Surveillance Data

- While AIDS data provide information on HIV infection that occurred about 10 years in the past, HIV data provide a picture of more recent infections. Positive HIV test reports sent from each province and territory are collated and synthesized at the national level by CIDPC. These reports show that before 2000 a steady decrease was seen in the proportion of positive HIV test reports attributed to MSM: from 74.2% before 1999 to around 48% in 1999. In 2000, the first increase since the 1980s was seen, the proportion of MSM among adult male positive HIV test reports being 53.7%; in 2005, this proportion was 57.1%.

MSM Continue to Account for the Greatest Number of Prevalent and Incident HIV Infections

- The 2005 national estimates of HIV prevalence (number living with HIV) and incidence (number newly infected in a year) indicate that MSM continue to be the most affected group. At the end of 2005, an estimated 58,000 (48,000-68,000) people in Canada were living with HIV infection (including AIDS) and, of these, 51% or 29,600 infections were estimated to be among MSM. The largest absolute increase in prevalent infections in 2005 was in the MSM exposure category, with 3,400 more prevalent infections since 2002 (13% relative increase). The combined exposure category of MSM and IDU (MSM-IDU) was estimated to be 4% of the total prevalent infections in both 2005 and 2002.[2]
- The number of new HIV infections in Canada in 2005 did not decrease and may have increased slightly compared with 2002. An estimated 2,300 to 4,500 new HIV infections occurred in 2005, and MSM accounted for the greatest number of these new infections, 1,100 to 2,000 (45% of the total), compared with 900 to 1,700 (42% of the total) in 2002.[2] As shown in Figure 1, the proportion of MSM among new infections steadily declined until 1996 and has increased since then.
- Estimates from Ontario mirror those found by the Public Health Agency of Canada (PHAC). Using data from a variety of sources, including HIV serodiagnoses, the Laboratory Enhancement Study (LES), and other studies, the Ontario HIV Monitoring Unit estimated a sharp increase in HIV incidence among MSM from 1977 to 1984, then a decrease to the lowest point in 1996, and an increase since: HIV incidence was estimated at 1.1% in 2004, compared with an incidence rate of 0.64% in 1996. HIV prevalence also increased over the study period, from 12.7% in 1997 to 16.0% in 2004.[3]

Figure 1. Distribution (%) of estimated new HIV infections among MSM, by time period



Recent Increases in Incidence Rates Noted in Some Parts of Canada

The results of several studies with varying methodologies from Ontario, Quebec, and British Columbia all point to a similar trend of recent increases in the incidence of HIV among MSM.

- In an analysis of MSM undergoing repeat HIV testing in Ontario during the 1993-2003 period, the overall incidence rate was 0.97 per 100 person-years (PY). Incidence declined in the pre-HAART (highly active antiretroviral treatment) era (1993-1996) and climbed again post-HAART (1997-2003). Incidence was highest in Toronto, followed by Ottawa, and was lowest in other regions of Ontario.[4]

- The LES uses the Serologic Testing Algorithm for Recent HIV Seroconversion (STARHS) assay to identify persons who were recently infected among those newly diagnosed with HIV infection. It revealed that the HIV incidence (per 100 PY) over a 3-year period was 2.2 among MSM and 2.4 among MSM-IDU.[4] A modest increase in HIV incidence among MSM was found in the latest 6-month period. Incidence was higher among Toronto MSM than elsewhere (2.9 vs 1.9). The authors stated that while the incidence was likely an overestimate, the trends probably reflected the real situation.[5]

- The Polaris HIV Seroconversion Study was an Ontario open cohort study initiated in 1998. This study found an incidence of 1.78 per 100 PY among 173 HIV-negative MSM followed up between June 1998 and January 2004.[6] An analysis of a subsample of 183 men in the Polaris study between 1998 and 2001 was carried out to identify risk factors for recent HIV infection: receptive anal sex without condoms (odds ratio [OR] = 4.4, $p = 0.01$) and delayed application of condoms (OR = 5.8, $p = 001$) were associated with recent seroconversion.[7]

Studies and Surveys of MSM

Several large studies have provided a wealth of information on the incidence and prevalence of HIV and HIV-related risk behaviours in Canada:

ARGUS 2005: A cross-sectional survey of 1,957 Montreal MSM to monitor HIV, HCV, and related risk behaviours, conducted in 2005. The survey is part of M-Track, PHAC's second-generation surveillance project.

Omega Cohort Study: A cohort study (1996-2003) on the incidence and psychosocial determinants of HIV infection among MSM living in Montreal. Participants completed a questionnaire and were tested for HIV every 6 months.

Ontario Men's Survey: A cross-sectional sociobehavioural and HIV prevalence study of 5,080 self-identified gay and bisexual men in 13 regions across Ontario, conducted in 2003.

Polaris HIV Seroconversion Study: An ongoing, longitudinal cohort study of seroconverters and HIV-negative controls in Ontario, initiated in 1998.

Sex Now: A survey of gay and other MSM in several sites across British Columbia, conducted in 2002 (*N* = 1,854) and 2004 (*N* = 2,690). A Sex Now survey was also conducted in Halifax (*N* = 310) in 2005.

Vanguard Project: A cohort study (1995-2003) of HIV in gay and bisexual men, ages 15 to 30, in the Greater Vancouver area of British Columbia. Participants completed questionnaires and were tested for HIV either annually or every 6 months.

- In Quebec, the Omega Cohort Study provided information on the incidence and psychosocial determinants of HIV infection among MSM living in Montreal. From October 1996 to August 2003, the overall incidence was 0.62 per 100 PY. It increased non-significantly from 0.43 to 0.83 per 100 PY in the last 3 years of the study.[8] The main risk factor for HIV seroconversion was unprotected anal sex. Risky oral sex had a borderline significant association with seroconversion.[9]

- In British Columbia, results from the Vanguard Project, a prospective cohort of young gay and bisexual men in Vancouver, indicated that the annual rate of new HIV infections among men who reported not injecting drugs increased from a range of 0.42-0.96 per 100 PY between 1997 and 2001 to 1.53 and 2.36 per 100 PY in 2002 and 2003 respectively.[10] Trends in the proportion of MSM testing positive were also analysed, and a sustained increase from 2000 to 2003 was found in the percentage of positive HIV-1 tests among non-IDU MSM who came forward for HIV testing.[10]

Prevalence Rates Among MSM: Past and Present

During the first decade of the epidemic, data (self-reported or test data) from surveys carried out directly with MSM showed a very high prevalence rate: 23% to 32% in Vancouver,[11,12] 27% to 57% in Toronto,[11,13] and 20% to 25% in Montreal.[11,14] More recent surveys using similar methods show a decline in the prevalence of HIV among MSM. As described below, prevalence rates in cities across Canada now range from 7% to 12%.

- For example, the 2005 Nova Scotia Sex Now Survey conducted during Halifax's Gay Pride Festival found an HIV prevalence rate of 11.1% in its sample of 310 participants.[15]

- The Ontario Men's Survey conducted in 2002 in 13 regions of the province found a prevalence of 9.4% (12.7% in Toronto, 4.9% in Ottawa, 7.7% in southern Ontario, and 3.7% in northern Ontario), excluding men who never reported sex with another man, who did not provide a saliva sample, or whose laboratory results were inconclusive.[16]

- ARGUS 2005 is the first of planned biennial surveys of Montreal MSM to monitor HIV, hepatitis C, and related risk behaviours. The survey is part of the national, second-generation surveillance project (M-Track) of PHAC. This survey found a prevalence of 12.5%.[17]

- The 2002 Sex Now survey in British Columbia reported an overall prevalence of 12.9% with a higher proportion of HIV-positive men being residents of Vancouver.[18] When the Sex Now survey was repeated in 2004, a slightly lower prevalence, of 11%, was found.[19]

- Higher prevalence rates are seen among MSM who are also IDU. In the I-Track surveillance system, which captures behavioural and HIV prevalence data among IDUs across Canada, data collected at seven sites across the country from 2003 to 2005 showed that more than a third (34.8%) of MSM/IDU were HIV positive.[20]

Continuing Risk Behaviour Among MSM

Recent data on risk behaviours suggest that MSM continue to be at considerable risk of HIV infection and other STIs by engaging in risk behaviours, such as unprotected anal intercourse (UAI) with partners of unknown serostatus. While differences in the methods used and the way in which risk behaviours are defined make it difficult to compare survey data over time, cohort studies in Montreal and Vancouver have found increases in risk behaviours during the late 1990s and early 2000s.

- In the 2005 Nova Scotia Sex Now survey, 20.2% of participants had engaged in risky sexual practices in the previous year, defined as any UAI with an individual whose HIV status was not known.[15]

- In the Ontario Men's Survey, nearly 40% of the participants reported at least one event of UAI with another man in the previous year, whereas nearly 35% of the participants reported that they had never experienced unprotected insertive anal intercourse.[16] With respect to casual sex, 57.1% reported sex with at least one casual male partner, and 16.0% reported at least one instance of UAI with a casual partner in the previous 3 months.[16]

- Delayed application of condoms was identified as a possible source of HIV transmission in the Polaris cohort study. In the Ontario Men's Survey, 52.4% reported at least one episode of delayed application. Of these, 27.8% reported safer sexual practices, indicating that while a substantial number of men report safer sexual practices, they are also engaging in this risk behaviour.[21]
- A brief questionnaire was completed by 327 HIV-positive and HIV-negative MSM enrolled in cohort studies in Toronto and Vancouver in June 2004. Fifty-nine percent reported having UAI with partners having unknown serostatus. The last such encounter was more recent among HIV-positive than HIV-negative men (a median of 1 month vs. a median of 12 months). Those who reported UAI with partners having unknown serostatus were more likely to agree to the statement that an HIV-negative partner would ask about the need to wear a condom before insertive UAI.[22]
- In the ARGUS 2005 survey, 21% of respondents reported having UAI with a casual partner at least once in the previous 6 months. Twenty-eight percent of participants with self-reported negative or unknown HIV status had had at least one episode of UAI with a partner who was HIV positive or whose serostatus was unknown; 9% had intentionally sought unprotected anal sex with a casual partner (barebacking).[23]
- In a trend analysis of the Omega Cohort Study data, UAI increased with regular seroconcordant partners (OR: 1.04) and any type of partner (OR: 1.03). There was also a non-negligible increase in UAI with casual partners (OR: 1.03). [24]
- In another Montreal-based study, 346 HIV-positive MSM were recruited for a study of HIV treatment-related perceptions of sexual risk behaviours. Thirty-four percent of participants reported at least one instance of UAI in the preceding 6 months.[25]
- With respect to relapse to risky behaviours, available data indicate that 10% of the Montreal cohort and 26% to 30% of the Vancouver cohort who reported safe sex at baseline disclosed relapse to unprotected anal sex at follow-up 6 to 12 months later.[26,27]
- The 2004 Sex Now survey in BC found that while the majority of participants reported practising safe sex, 25% reported unprotected sex with a partner of unknown serostatus in the previous year.[19] This was similar to the finding of the 2002 Sex Now survey, i.e. 27% of participants reported unprotected sex with a partner of unknown serostatus in the previous year.[19]
- Between May 1995 and September 2001, an increasing number of participants in the Vanguard Project reported unprotected insertive (relative risk: 3.5) and receptive (relative risk: 5.1) anal sex with an HIV-positive partner; this increase in UAI was associated with seroconversion.[28] In the same study, during the period from September 2001 to December 2003, it was observed that the majority of seroconversions occurred in the small minority (15%) of those who reported serodiscordant receptive UAI.[29]

Correlates and Causes of Risky Behaviours Among MSM

As described below, the causes of ongoing risk behaviours among MSM are complex. Relations between risk behaviours and a variety of factors have been found, including condom and erectile difficulties, stressful events, drug use, having an increased number of partners, and the increased use of public cruising sites. Little or no association has been found between risk behaviours and macrosocial factors (i.e., educational attainment, employment status, socio-professional categories, income).

- Data from the 2005 Nova Scotia Sex Now survey found no relation between income, education, age, ethnicity, relationship status, or drug use (with the exception of marijuana) and risky sexual practices. Moderate associations were found between increased number of partners, negotiated relationships, increased use of public cruising sites, and rates of risky sexual practice in the previous year.[15]

- In-depth interviews with 102 high-risk gay and bisexual men revealed that unprotected sex was the result of a variety of circumstances, including condom and erectile difficulties, momentary lapses, depression and stressful events, and was a by-product of strategies of disclosure and use of intuition to gauge safety.[30]

- The Polaris study, an open cohort of MSM in Ontario, examined the association between stressful relationship events and HIV risk behaviour, and found that those who experienced such events were more likely to engage in UAI with a regular partner (OR 3.1. $p = 0.002$).[31]

- Data from the Ontario Men's Survey were used to explore risk behaviours among subcommunities of MSM in Ontario. Those who socialized with "leather men", "bears", older men, gay men, or HIV-positive men were more likely to report UAI in the previous year.[32] In the same study, it was found that men who received non-monetary resources for sex, in comparison with men who received money for sex, were more likely to be HIV positive, have a history of gonorrhea, and to have used cannabis, tranquillizers, or cocaine in the previous year.[33]

- Using data collected through the Omega Cohort Study, the association between macrosocial factors (i.e. educational attainment, employment status, socio-professional categories, income) and UAI was examined. Two-way analysis of variance showed that MSM with lower educational attainment had more UAI with risky partners ($F = 5.67, p < 0.001$). Other macrosocial factors showed little association with UAI.[34]

- In a separate analysis of Omega Cohort Study participants, individual and macro-social factors and their association with risk behaviours was explored. A number of individual factors were significantly associated with UAI, such as being a sexual-sensation seeker and being more likely to have sex with a regular or a casual partner in a bathhouse; none of the macrosocial factors was significant.[35]

- In a 2004 on-line questionnaire completed by gay and bisexual French-speaking Quebec men, 66.7% reported a face-to-face encounter with a man they had met on-line. Of these, 21.9% reported at least one episode of UAI with a sexual partner whom they had met on-line. Compared with those who reported face-to-face encounters and no UAI with a man they had met in this way, these men scored higher on a measure of sensation seeking, made more intense use of the Internet for sexual purposes, and attributed more positive repercussions to this activity.[36]

- Data from the Vanguard Project and the Omega Cohort Study were combined and analysed to compare the sexual behaviours of HIV-positive and HIV-negative gay and bisexual men aged 16 to 30 years. High-risk behaviour among MSM in both cities was associated with nitrite inhalant use, and sex in public and commercial sex venues. Independent determinants of risk-taking among men in both cities were the use of poppers (Vancouver: OR 2.1, Montreal: OR 2.9) and having sex in a bathhouse (Vancouver: OR 1.9, Montreal OR 1.8). In Vancouver, having sex in a bar (OR: 1.8) and having at least 20 casual partners in the previous year (OR: 1.7) were associated with high-risk sex. Among men in Montreal, having a casual partner (OR: 3.0) and having at least two regular partners in the previous year (OR: 3.0) were independently associated with high-risk sexual behaviour.[37]

- In the Vancouver Vanguard Project, the increase in UAI with casual partners observed from 1997 to 2002 was found to be independent of an increase seen in the use of crystal methamphetamine.[38] In a separate analysis using data from the same cohort, the use of methamphetamine was specifically associated with receptive UAI with casual partners.[39]

- From the cross-sectional data collected between 2002 and 2003 in the Vanguard Project, use of ketamine, GHB (gamma butyrolactone), ecstasy, and Viagra within 2 hours of encounters was found to be associated with UAI with casual partners of unknown HIV status.[40]

- In the 2004 Sex Now survey conducted in BC, men who reported having had UAI with a partner of unknown serostatus were more likely to also report the following: they felt pressured to have unprotected sex (OR = 3.6); they broke an agreement with a partner (OR = 3.3); they did not care at the time (OR = 3.2); they engaged in high-volume sex (OR = 2.7); and they used crystal meth (OR = 2.6). This survey also found that age was not related to UAI with a partner of unknown serostatus; that men who had 10 or more partners per year were more likely to engage in UAI with a partner of unknown serostatus; and that men who used certain venues (e.g. baths, Internet, sex party, phone-line, or parks) were more likely to report having had UAI with a partner of unknown serostatus.[19]

- The recent rise in rates of reportable STI in Canada may also be used as a marker of unsafe sexual behaviour. The elimination of infectious syphilis, the least commonly reported bacterial STI in Canada, was seen as an imminent goal as recently as 1996; however, national infectious syphilis rates (preliminary) were almost nine times higher in 2004 than they were in 1997 (3.5/100,000 vs. 0.4/100,000 versus). Despite limitations of surveillance data in assessing the risk behaviours of reported cases, this increase is disproportionately higher among males, who accounted for 88.5% of all reported cases in 2004 (Community Acquired Infections Division, CIDPC, PHAC: unpublished data, 2006). Similarly, a review of the gonorrhea surveillance data (CIDPC unpublished data, 2006) in Canada reveals that reported cases of gonorrhoea among men increased by 119.9% between 1997 and 2002 (compared with a 87.2% increase among females). Lymphogranuloma venereum (LGV) is a sexually transmitted infection that until recently was rare in industrialized countries. However, starting in 2003, cases in MSM have been reported in Europe, the United States, and Canada. As of April 5, 2006, there were 66 cases of LGV reported to the PHAC. All reported cases have been male, and most cases reported recent sex, often unprotected with male partners, which occurred primarily in bathhouses.[41] The rising rates of syphilis, increase in gonorrhea rate, and emergence of LGV in Canada further support the suggestion of an increase in unprotected sexual encounters among MSM.

Comment

A number of biases must be taken into account when interpreting the results noted here. HIV diagnostic data are limited to persons who present themselves for testing, and so trends in these numbers may be influenced by testing patterns or improved ability to remove duplicate tests. In addition, identifying information that accompanies HIV testing data is sometimes incomplete or inaccurate, and this may limit the usefulness of HIV incidence estimates. Results of cohort studies are limited by selection biases, loss to follow-up, and problems with generalizability.

Despite these limitations, available data suggest that there was an increase nationally in new HIV infections among MSM in the late 1990s, and although this increase may not have continued, overall incidence does not appear to have decreased since then. There is also a continued and perhaps increasing presence of high-risk behaviours among MSM across the country. This high-risk behaviour among MSM is also noted elsewhere. For example, increases have been seen in HIV-associated risk behaviours and/or STIs among MSM in the United States,[42-44] Amsterdam,[45] and Sydney, Australia.[46]

Several hypotheses might explain these increases in HIV-associated risk behaviours, including alcohol/drug use,[37,47-49] feelings of complacency or optimism related to the success of antiretroviral therapy,[51] false reassurance upon learning of an HIV-negative result, misconceptions about a partner's HIV status, a lack of direct experience of the AIDS epidemic in the younger generation of gay men, a desire to escape the rigorous norms and standards required for a lifetime of safe sex,[47, 51,52] and the impact of Internet chat rooms as a risky environment.[53]

The increase in new infections among MSM and the number of MSM living with HIV underscore the need for innovative prevention programs to reduce the spread of HIV and STIs in the gay community. These programs should not only focus on those who are not yet infected but also on those who are HIV positive. Risk behaviour measured over time and in different settings that reflect urban and rural areas of Canada, as well as diverse populations, would be useful to better characterize the epidemic among MSM and to support effective prevention and care programs.

References

1. Public Health Agency of Canada. *HIV and AIDS in Canada: surveillance report to December 31, 2005.* Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, 2006.
2. Boulos D, Yan P, Schanzer D et al. *Estimates of HIV prevalence and incidence in Canada, 2005.* CCDR 2006;32(15) (in press).
3. Remis RS, Swantee C, Schiedel L et al. *Report on HIV/AIDS in Ontario, 2004.* Toronto: Ontario Ministry of Health and Long-term Care, February 2006.
4. Burchell A, Calzavara L, Remis R et al., and the Polaris Study Team. *No decline in incidence density among men who have sex with men undergoing repeat diagnostic testing in Ontario.* Ontario HIV Treatment Network Research Conference, 2005.
5. Remis RS, Swatnee C, Fiker Merid M et al. *Enhancing diagnostic data for HIV surveillance: the Ontario Laboratory Enhancement Study* (LES). Ontario HIV Treatment Network Research Conference, 2004.
6. Medved W, Calzavara LM, Gardner S et al. *HIV incidence and risk behaviours among HIV-negative MSM who seroconverted during follow-up in the Polaris cohort.* Can J Infect Dis 2005;15(Suppl A):40A(Abstract 227).
7. Calzavara L, Burchell AN, Remis RS et al. *Delayed application of condoms is a risk factor for human immunodeficiency virus infection among homosexual and bisexual men.* Am J Epidemiol 2003;157(3):210-17.
8. Remis RS, Alary M, Tois J et al., and the OMEGA Study Group. *Trends in HIV incidence and sexual behaviour in a cohort of men who have sex with men (MSM), Montréal, 1996-2003.* Can J Infect Dis 2004;15(Suppl A):55A(Abstract 318).
9. Lavoie E, Alary M, Otis J et al. *HIV incidence and associated behavioural risk factors among men having sex with men (MSM) in the Omega Cohort Study (OCS), Montreal, Quebec.* Can J Infect Dis 2005;15(Suppl A):74A (Abstract 350P).
10. Lampinen TM, Ogilvie G, Chan K et al. *Sustained increase in HIV-1 incidence since 2000 among men who have sex with men in British Columbia, Canada.* J Acquir Immune Defic Syndr 2005;40(2):242-44.
11. Myers T, Godin G, Calzavara L et al and the Canadian AIDS Society Team. *The Canadian Survey of Gay and Bisexual Men and HIV infection: men's survey.* Ottawa: National AIDS Clearinghouse, 1993 (Catalogue ISBN 0-921906-14-5).

12. Craib KJP, Strathdee SA, Hogg RS et al. *Incidence rates of HIV-1 infection, AIDS progression and mortality in the Vancouver Lymphadenopathy-AIDS Study: results at 14 years*. Can J Infect Dis 1998;9:31A(Abstract 213).

13. Coates R, Calzavara LM, Read SE et al. *A prospective study of male sexual contacts of individuals with ARC or AIDS*. Final report to National Health Research and Development Program, 1992.

14. Remis RS, Najjar M, Pass C et al. *Seroepidemiological study of HIV infection and sexual behaviour among men attending a medical clinic in Montreal*. Vth International Conference on AIDS, Montreal, Canada, June 1989, (Abstract WAP42).

15. Westhaver R, Allan R. *The Nova Scotia Sex Now project: an invitation*. Halifax, Nova Scotia: AIDS Coalition of Nova Scotia, 2006.

16. Myers T, Allman D. *Ontario men's survey*. Toronto: HIV Social, Behavioural and Epidemiological Studies Unit, University of Toronto, 2004. URL: <www.mens-survey.ca>.

17. Lambert G, Cox J, Tremblay F et al. *Recent HIV testing behaviour among men having sex with men (MSM) in Montreal: results from the ARGUS 2005 survey*. 15th Annual Canadian Conference on HIV/AIDS Research, Quebec, Canada, May 2006 (Abstract 313).

18. Trussler T, Marchand R, Barker A. *Sex Now by the numbers: a statistical guide to health planning for gay men*. Vancouver, BC: Community-based Research Centre, 2003.

19. Community-Based Research Centre. *Sex Now: 2004. Do it again*. URL: <http://cbr.cbrc.net/files/1126563826/DO%20IT%20AGAIN.pdf>. Accessed May 4, 2006.

20. Public Health Agency of Canada. *I-Track (2003-2005)*. Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control. Unpublished data, April 2006.

21. Myers T, Allman D, Calzavara L et al. *Delayed application of condoms in a community sample of gay and bisexual men: misperceptions of safer sex?* Can J Infect Dis 2005;15(Suppl A):42A (Abstract 230).

22. Chan, K, Lampinen TM, Medved W et al. *Unprotected anal intercourse with partners having unknown HIV serostatus in relation to disclosure-related social norms among gay men*. Can J Infect Dis 15(Suppl A):61A (Abstract 304P).

23. Lambert G, Cox J, Tremblay F et al. *Sexual risk behaviours among men having sex with men (MSM) in Montreal: results from the ARGUS 2005 survey*. 15th Annual Canadian Conference on HIV/AIDS Research, Quebec, Canada, May 2006 (Abstract 313).

24. George C, Alary M, Otis J et al. *Nonnegligible increasing temporal trends in unprotected anal intercourse among men who have sexual relations with other men in Montreal*. J Acquir Immune Defic Syndr 2006;41(3):365-70.

25. Cox J, Beauchemin J, Allard R. *HIV status of sexual partners is more important than antiretroviral treatment related perceptions for risk taking by HIV positive MSM in Montreal, Canada*. Sex Transm Infect 2004;80:518-23.

26. Remis RS, Alary M, Otis J. *HIV infection and risk behaviours in young gay and bisexual men* (Letter to editor and response [Hogg RS, Strathdee SA, Chan K et al.]). Can Med Assoc J 2000;163(1):14-15.

27. Strathdee SA, Martindale SL, Cornelisse PGA et al. *HIV infection and risk behaviours among young gay and bisexual men in Vancouver*. Can Med Assoc J 2000;162(1):21-5.

28. Weber AE, Craib DJP, Chan K et al. *Predictors of HIV seroconversion among young gay men who have sex with men*. Can J Infect Dis 2002;13(Suppl A):49A,319.

29. Lampinen TM, Chan K, Miller ML et al. *Are HIV seroincidence rates among gay men in Vancouver increasing? Here is one excellent reason not to care*. Can J Infect Dis 2004;15(Suppl A):60A(Abstract 336P).

30. Adam BD, Husbands W, Murray J et al. *AIDS, optimism, condom fatigue, or self-esteem? Explaining unsafe sex among gay and bisexual men*. J Sex Res 2005;42(3):238-48.

31. Anonychuk A, Calzavara LM, Raboud JM et al., the Polaris Study Team. *The association between stressful relationship events and HIV-risk behaviour among MSM: results from*

the Polaris study. Can J Infect Dis 2004;15(Suppl A):58A(Abstract 331P).

32. Allman D, Myers T, Calzavara L et al. *Subcommunities and risk associations: variations among social scenes of men who have sex with men in Ontario*. Can J Infect Dis 2005;15(Suppl A):18A(Abstract 130).
33. Allman D, Myers T, Calzavara L et al. *Do men who receive money vs. goods or drugs for sex differ?* 15th International AIDS Conference, Bangkok, Thailand, July 11-16, 2004 (Abstract TuOrC1199).
34. Blais M, Otis J, Alary M et al. *Macrosocial correlates of unprotected anal intercourse (UAI) among men who have sex with men (MSM) in Montreal*. Can J Infect Dis 2005;15(Suppl A):79A (Abstract 370P).
35. Otis J, Alary M, Remis RS et al. *Seroconversion in men who have sex with men (MSM) of the Omega Cohort Study (Montreal, Quebec): a psychosocial and ecological perspective*. Can J Infect Dis 2005;15(Suppl A):18A (Abstract 131).
36. Engler K, Frigault L, Leobon A et al. *A comparison between men reporting sexual risk with an Internet partner and men who did not among gay and bisexual Quebec men who had a face-to-face encounter with someone they met online*. Can J Infect Dis 2005;15(Suppl A):17A (Abstract 127).
37. Weber AE, Otis J, Chan K et al. *Factors associated with high-risk sexual behaviour among men who have sex with men (MSM) in two Canadian cohorts*. Can J Infect Dis 2002;13(Suppl A):45A, 355.
38. Lampinen TM, Rusch M, Schilder AJ et al. *Relation between temporal trends in crystal methamphetamine use and unsafe sex with casual partners among young gay men in Vancouver*. Can J Infect Dis 2005;15(Suppl A):42A (Abstract 229).
39. Rusch M, Lampinen TM, Schilder A et al. *Unprotected anal intercourse associated with recreational drug use among young men who have sex with men depends on partner type and intercourse role*. Sex Transm Dis 2004;31(8):492-98.
40. Schilder AJ, Lampinen TM, Chan K et al. *Substance use among gay men specific to encounters with casual sex partners of unknown HIV serostatus and relation to high risk sex*. Can J Infect Dis 2004;15(Suppl A):62A(Abstract 343P).
41. Public Health Agency of Canada. *Lymphogranuloma Venereum (LGV) Epi Update*. Ottawa: Surveillance and Epidemiology Unit, Community Acquired Infections Division, Centre for Infectious Disease Prevention and Control. URL: <http://www.phac-aspc.gc.ca/publicat/epiu-aepi/std-mts/lgv_e.html>. Accessed on April 5, 2006.
42. Denning P, Nakashima AK, Wortley P. *Increasing rates of unprotected anal intercourse among HIV-infected men who have sex with men in the Unites States*. 13th International AIDS Conference, Durban, South Africa, July 9-14, 2000 (Abstract no. ThOrC714).
43. Page-Shafer KA, McFarland W, Kohn R et al. *Increases in unsafe sex and rectal gonorrhea among men who have sex with men — San Francisco, California, 1994-97*. MMWR 1999;48:45-8.
44. Handsfield HH, Whittington WLH, Desmon S et al. *Resurgent bacterial sexually transmitted disease among men who have sex with men – King County, Washington, 1997-99*. MMWR 1999;48:773-77.
45. Dukers N, de Wit J, Goudsmit J et al. *Recent increase in sexual risk behaviour and sexually transmitted diseases in a cohort of homosexual men: the price of highly active antiretroviral therapy?* 13th International AIDS Conference on AIDS, Durban, South Africa, July 9-14, 2000 (Abstract ThOrC715).
46. Van De Ven P, Prestage G, French J et al. *Increase in unprotected anal intercourse with casual partners among Sydney gay men in 1996-98*. Aust N Z Public Health 1998;22:814-18.
47. Dufour A, Alary M, Otis J et al., and the Omega Study Group. *Correlates of risky behaviours among young and older men having sexual relations with men in Montréal, Québec, Canada*. J Acquir Immune Defic Syndr 2000;23:272-78.
48. Mansergh G, Colfax GN, Marks G et al. *The Circuit Party Men's Health Survey: findings*

and implications for gay and bisexual men. Am J Public Health 2001;91:953-58.

49. Dolezal C, Meyer-Bahlburg HF, Remien RH et al. *Substance use during sex and sensation seeking as predictors of sexual risk behaviour among HIV+ and HIV- gay men*. AIDS and Behavior 1997;1:19-28.

50. Hansen L, Wong T, Perrin M. *Gonorrhoea resurgence in Canada*. Int J STD AIDS 2003;14:727-31.

51. Ostrow DG, Fox K, Chmiel JS. *Attitudes toward highly active antiretroviral therapy predict sexual risk-taking among HIV infected and uninfected gay men in the Multicenter AIDS Cohort Study (MACS)*. 13th International AIDS Conference on AIDS, Durban, South Africa, July 9-14, 2000 (Abstract ThOrC719).

52. Katz MH. *AIDS epidemic in San Francisco among men who report sex with men: successes and challenges of HIV prevention*. J Acquir Immune Defic Syndr 1997;14(Suppl 2):838-46.

53. McFarlane M, Bull S, Reitmeijer S. *The Internet as a newly emerging risk environment for sexually transmitted disease*. JAMA 2000;284(4):443-46.

Acknowledgements

National level HIV and AIDS surveillance is possible as a result of all provinces and territories participating in, and setting directions for, HIV and AIDS surveillance. CIDPC acknowledges the provincial/territorial HIV/AIDS coordinators, public health units, laboratories, health care providers, and reporting physicians for sharing non-nominal, confidential data for national surveillance.

For more information, please contact:

Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture
Postal locator: 0602B
Ottawa, ON K1A 0K9
Tel: (613) 954-5169
Fax: (613) 957-2842
www.phac-aspc.gc.ca

Mission

To promote and protect the health of Canadians through leadership, partnership, innovation and action in public health.

Public Health Agency of Canada

This page has been intentionally left blank.

Public Health Agency of Canada
Agence de santé publique du Canada
Canada

HIV/AIDS
Epi Update
Centre for Infectious Disease Prevention and Control

HIV/AIDS Among Injecting Drug Users in Canada

At a Glance

- **Injecting drug use accounted for 7.8% of cumulative adult AIDS cases and 16.9% of cumulative adult positive HIV test reports up to December 31, 2005.**
- **The 2005 national HIV estimates indicate that the proportion of new HIV infections attributed to injecting drug use decreased from 19% in 2002 to 14% in 2005.**
- **The estimated number of new HIV infections among IDU in 2005 (350-650) remains unacceptably high.**
- **An enhanced surveillance system (I-Track) has been under way at selected centres across Canada to monitor HIV-associated risk behaviours, and HIV and HCV prevalence among IDU.**

CIDPC Website:

www.phac-aspc.gc.ca/hast-vsmt/

Introduction

In the early 1980s, the Canadian HIV epidemic was concentrated among men who have sex with men (MSM). By the early to mid-1990s, there was a change toward increasing transmission among injecting drug users (IDU), and by 1996 approximately 35% of new HIV infections that occurred in Canada that year were among IDU.[1] The current national HIV estimates indicate that the proportion of new infections among IDU had decreased to 14% of all new infections in 2005 (350-650 of a total 2,300-4,500 new infections).[1] A similar trend has occurred in the adult positive HIV tests reported to the Centre for Infectious Disease Prevention and Control (CIDPC). Surveillance data as of December 31, 2005, indicate that in 2005, 19.5% of adult positive HIV tests reported to CIDPC were attributed to IDU, down from a peak of just over 33% in 1996 and 1997.[2] This *Epi Update* presents information on the status of HIV/AIDS among IDU in Canada.

10

AIDS Surveillance Data[3]

Injecting Drug Use Remains a Significant Exposure Category among AIDS Cases

- As of December 31, 2005, there have been 20,353 AIDS cases reported to CIDPC since the early 1980s (includes cases reported up to June 30, 2003, from Quebec; data on the number of reported AIDS cases from Quebec after that date were not available; data from Ontario on the exposure category of cases reported in the second half of 2005 were not available). Of the 19,024 cumulative adult AIDS cases with known exposure category, 7.8% (1,488) were attributed to injecting drug use and, of these, 72.9% were males. An additional 4.3% (825) were attributed to MSM who also inject drugs (MSM/IDU).

- There was a rise in the proportion of IDU among reported adult AIDS cases from 6.3% in 1993 to 21.9% in 1998. From there it dropped steadily to a low of 15.5% in 2001 before peaking at 22.4% in 2003 and since then has shown a decline to 17.6% in 2005 (Figure 1).
- The proportion of adult male AIDS cases attributed to IDU steadily increased from 3.8% in 1992 to a peak of 22.0% in 2003, and later decreased to 11.2% in 2005.
- Females represent 27.0% of the total cumulative adult AIDS cases attributed to IDU for which exposure category and gender are reported. The proportion of adult female AIDS cases attributed to injecting drug use increased steadily from 18.0% in 1992 to a peak of 46.2% in 1998. This proportion dropped to 39.6% in 2000, and trends since then are difficult to interpret because of the small number of reported cases.

HIV Surveillance Data[2]

Proportion of Adult HIV Positive Test Reports among IDU Continues Gradual Decline

While AIDS data provide information on HIV infections that occurred about 10 years in the past, HIV data provide a picture of more recent infections.

- Of the 29,865 cumulative positive HIV tests in adults reported to CIDPC with exposure category information since reporting began in 1985 to December 31, 2005, 16.9% were attributable to injecting drug use (68.1% of the positive HIV reports in the exposure category of IDU were males). An additional 2.3% were attributed to MSM/IDU.
- Figure 2 shows the proportion of adult positive HIV tests attributed to injecting drug use by year of test, to the end of 2005. This proportion has gradually decreased from 26.0% in 2000 to 19.5% in 2005.
- The proportion of positive HIV test reports in adult females that could be attributed to IDU was 39.9% in 2000, and showed a decline in the following years to 26.7% in 2003, before increasing again by 2005 to 34.9%. The proportion in adult males attributable to IDU has shown a steady decrease from a high of 23.0% in 2001 to 14.6% in 2005.
- Of positive HIV test reports attributed to IDU reported between January 1, 2005, and December 31, 2005, for which age and risk information was reported, the highest proportion was among those aged 30-39 years (36.4%), followed by those aged 40-49 years (30.0%).

Figure 1. Proportion of adult AIDS cases attributed to IDU, by year of diagnosis 1993-2005

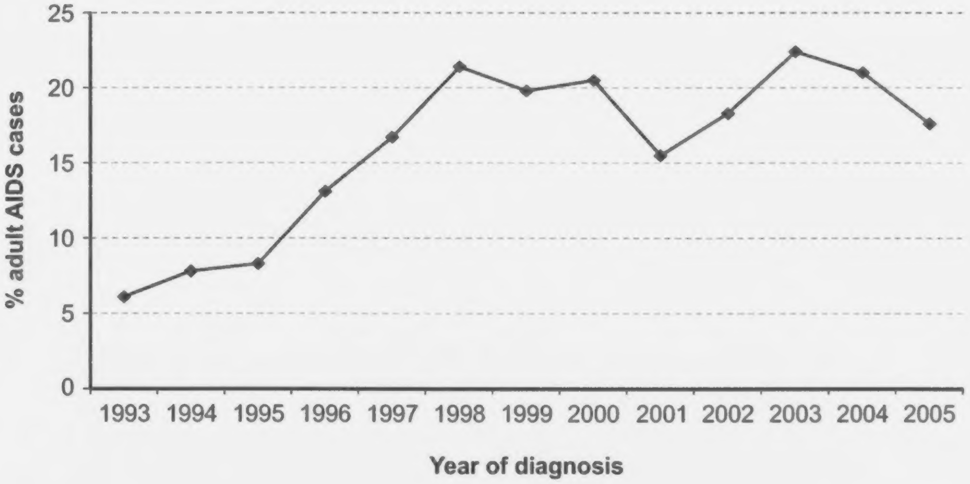
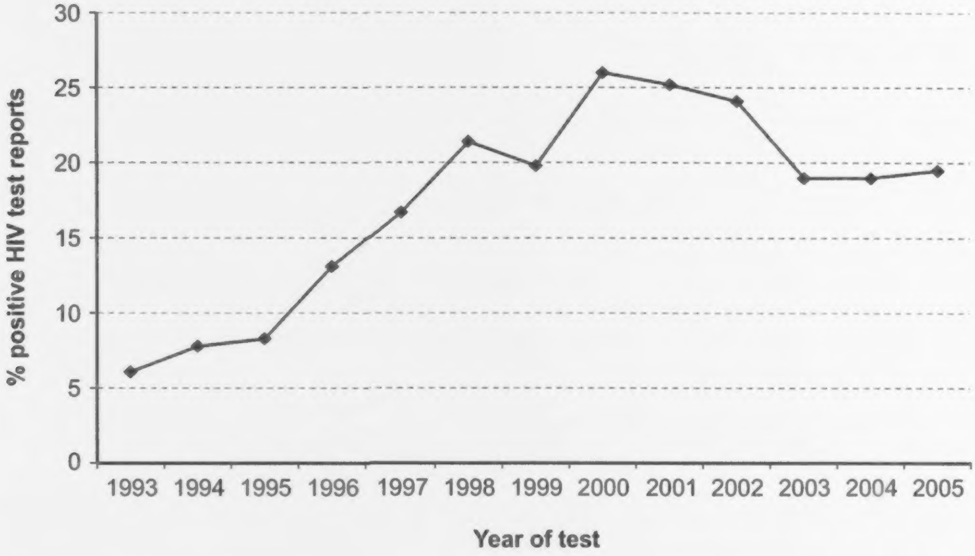


Figure 2. Proportion of adult positive HIV test reports attributed to IDU, by year of test 1985-2005



Studies Confirm HIV Prevalence Remains Unacceptably High at Sentinel Sites across Canada

In response to a need for ongoing monitoring of HIV prevalence and incidence rates as well as risk behaviours in IDU populations from across the country, an HIV- and hepatitis C (HCV)-associated risk behaviour enhanced surveillance system (I-Track) has been established by the Public Health Agency of Canada at sentinel sites across Canada. This has been achieved through collaboration with provincial, regional and local health authorities, community-based organizations, and researchers. A pilot study of the I-Track surveillance system was undertaken between October 2002 and August 2003, when a total of 1,062 IDU were surveyed in Victoria, Regina, Sudbury, Toronto, and in Quebec and Ottawa through linkages made with the SurvUDI.[3] Since then Phase I of the I-Track study was completed between October 2003 and May 2005 with the addition of Edmonton and Winnipeg. Phase II is under way, and new sites are being added for future rounds. Selected findings from Phase I of the I-Track study are reported below, as well as those reported by other studies among IDU in Canada.

HIV prevalence among IDU

HIV prevalence at participating sites under I-Track are quite variable,[4,5] ranging from a low of 1.2% in Regina in 2002-03 to a high of 19.6% at sites under SurvUDI (2003-04).[3] In Phase I of the I-Track studies, the prevalence of HIV has ranged from 2.9% in Regina to 23.8% in Edmonton.[5] The HIV prevalence at sites under I-Track is given in Table 1.

- At the recently opened safe injection site in Vancouver, a cohort of IDU that uses the facility was recruited from December 1, 2003, to 2005 to participate in the Insite Cohort Study. Of the 1,007 subjects, 17% were HIV positive.[9]
- In a cohort study, 203 participants were recruited into low-threshold methadone programs at two sites in Ontario by December 2003. The HIV prevalence at the time of entry was found to be 7%, 84% of the HIV positive knew their serostatus, and 77% of the HIV infected were co-infected with HCV. The HCV prevalence was 48%.[10]
- HCV prevalence rates were high at all I-Track sentinel centres and ranged from

Table 1. HIV prevalence (%) at selected centres and years

	Other studies				I-Track			
	1986-90	1992-94	1997-98	2000	2002	2003	2004	2005
Edmonton								23.8[5]
Quebec, including Ottawa						19.6[6]	17.3[6]	
Regina				2[6]	1.2[4]			2.9[5]
Sudbury					10.1[4]		12.2[5]	
Toronto		5.5[7]	8.6[7]		5.1[4]	7.6[5]		
Victoria					16.0[4]	15.4[5]		12.5[5]
Winnipeg	2.3[7]		12.6[8]					13.1[5]

61.8% in Winnipeg to 68.5% in Sudbury and Victoria.[5] In the SurvUDI network, baseline HCV prevalence at the time of first interview was estimated to be 60.4%.[11]

- The co-infection rate at the four participating sites (Regina, Sudbury, Toronto, and Victoria) in which participants are infected with both HIV and HCV was found to be 7.8% overall in the I-Track pilot phase[5] and 11.7% in Phase I.[5]

- The SurvUDI study has been under way since 1995 and consists of centres providing needle exchange services and other prevention programs to IDU in the province of Quebec and in Ottawa, Ontario. HIV prevalence for the overall network increased significantly from 12.2% in 1995 to 18.6% in 2002.[12] In 2002, HIV prevalence in Montreal, Ottawa, and Quebec was found to be 23.3%, 19.7%, and 15.9% respectively.[13]

- In a study from Quebec City on differences in risk behaviour between users of needle exchange programs (NEP) and detoxification centre participants, the prevalence of HIV among NEP users was 12.1% vs. 9.1% for the detoxification centre participants.[14]

HIV incidence among IDU

- Results indicate that HIV incidence among repeat service attendees in the SurvUDI network decreased from 5.1 per 100 person-years (PY) in 1995 to a range of 2.3–3.3 per 100 PY during 2001-04. Overall incidence from 1995 to 2005 was 2.5 per 100 PY in Quebec City, 4.0 per 100 PY in Montreal, 4.1 per 100 PY in Ottawa and the Outaouais, 1.7 per 100 PY in semi-urban sites, and 3.3 for the overall SurvUDI network.[15] The estimated HIV incidence among the participants recruited between October 2002 and January 2003 in Ottawa was 2.3 per 100 PYs.[16]

- The POLARIS study investigated HIV incidence according to risk category among repeat testers in Ontario's diagnostic HIV-testing database during the period 1992-2000. HIV incidence among IDU decreased from 0.64 per 100 PY in 1992 to 0.14 per 100 PY in 2000.[17]

- A study examining trends in HIV incidence in Ontario based on identifying recent infections among new HIV diagnoses (using the serological testing algorithm for recent HIV seroconvertors or STARHS assay) found that HIV incidence during a 3-year period (October 1999 to December 2002) among IDU was 0.23 per 100 PY. The incidence during the same period was 0.25 per 100 PY in Toronto, 0.71 per 100 PY in Ottawa, and 0.15 per 100 PY elsewhere in Ontario.[18,19] Over time, HIV incidence among IDU in Ontario appeared to decrease.[17] The estimated incidence of

HIV in Ontario in 2003 based on the detuned assay was 0.09 per 100 PY in Toronto, 0.29 per 100 PY in Ottawa, and 0.13 per 100 PY in other regions of Ontario.[20]

- Results from the Vancouver Injection Drug User Study (VIDUS) showed that HIV incidence was 1.5 per 100 PY in 2000, down from 10.3 in 1997 and 3.2 in 1999.[21] In the VIDUS cohort enrolled between May 1996 and May 2003 the cumulative incidence at 64 months after enrollment was 14%.[22]
- Further research from VIDUS compared cumulative HIV incidence among daily NEP users and non-daily NEP users. Daily NEP users had a higher 48-month cumulative incidence rate, at 18.1%, as compared with 10.7% among non-daily NEP users.[23]
- In a study in Ottawa, HCV incidence was found to be 25.0 per 100 PY.[16] In the SurvUDI network, the incidence of HCV during the period from 1997 to 2003 was 27.1 per 100 PY.[11]
- Research from the St. Luc cohort in Montreal revealed an overall incidence rate of 2.6 per 100 PY from 1992 to 2004. The rate was at its highest in 1997, at 2.5 per 100 PY, and at its lowest in both 1998 and 2001 at 1.6 per 100 PY. For 2004 the rate was 1.8 per 100 PY.[24]

IDU component of national HIV estimates

- Of the estimated 58,000 persons living with HIV in Canada in 2005, about 9,860 (17%) were IDU. This compares with an estimate of 8,900 IDU living with HIV infection in 2002.[1]

An estimated 350-650 new HIV infections occurred among IDU in 2005, which represents about 14% of the estimated total of 2,300-4,500 new infections.[1] This is slightly less than the estimated 400-700 (19% of total) new infections among IDU in 2002. Although this difference is hard to interpret given the broad ranges of uncertainty associated with the incidence estimates, it is suggestive of a decrease that is consistent with the other data presented in this *Epi Update*. Possible reasons for such a decrease include the adoption of safer injecting practices among IDU, shifting patterns of drug use, and effective prevention programming.

Women, youth and Aboriginal IDU are particularly at risk of HIV infection

Women

- Since 1996, approximately one-quarter to one-half of new HIV test reports among women have been attributed to injecting drug use. The latest national HIV estimates published by CIDPC indicate that of the estimated 620 to 1,240 new infections among women in 2005, 24% were attributed to injecting drug use.[1]
- Findings from the VIDUS study in Vancouver show that during the period May 1996 to December 2000, HIV incidence rates among female IDU in Vancouver were about 40% higher than those of male IDU.[25]

Youth

- Results from Phase I of the I-Track survey indicate that 25.5% of males and 29.9% of females[5] reported initiation of injecting at the age of 16 years or younger.[4]
- High HIV incidence rates were found among young IDU when the VIDUS study in Vancouver examined rates of HIV positivity among IDU participants who were 24 years of age and younger. HIV incidence rates in this age group were 2.96 and 5.69 per 100 PY among males and females respectively,[26] compared with an overall incidence rate of 1.5 per 100 PY in 2000.[21] This study also found that among young IDU (age 13-24 years), HIV prevalence was associated with female sex, history of sexual abuse, engaging in survival sex, injecting heroin daily, injecting speedballs daily, and having numerous lifetime sexual partners.[27]

- The HIV incidence among street youth in the Montreal Street Youth Cohort Study was 0.69 per 100 PY as of September 2000. Injecting drug use was the strongest predictor of HIV seroconversion (becoming HIV positive).[28]

- The Enhanced Surveillance of Canadian Street Youth (ESCSY) is a national, multi-centre, cross-sectional surveillance system of Canadian street youth aged 15-24, which examines sexually transmitted infections, blood-borne pathogens, and risk behaviours among street youth. Results of phases II and III of ESCSY show that approximately one-fifth of street youth surveyed had injected drugs in their lifetime.[29] The HIV prevalence among street youth who injected drugs in the ESCSY was observed to be 0.6%, 2.9%, and 1.0% in 1999, 2001, and 2003 respectively. Further, injecting drug using street youth accounted for 66.7%, 60.0%, and 37.5% of HIV-positive street youth in 1999, 2001, and 2003 respectively, despite accounting for only 20.1%, 17.2%, and 21.2% of the street youth in each of those years (Sexual Health and STI Section, Community Acquired Infections, CIDPC: personal communication, 2006).

Aboriginal

- Aboriginal persons are overrepresented in many IDU populations, and a larger proportion of Aboriginal HIV and AIDS cases are attributed to IDU than non-Aboriginal cases.[30] The 2005 national HIV estimates indicate that 53% of all new HIV infections among Aboriginal people in 2005 were attributable to injecting drug use, a proportion considerably higher than the 14% of overall new infections attributed to IDU.[1]

- Results from Phase I of the I-Track survey showed that 41.9% of the study participants identified themselves as being of Aboriginal ethnic background. Most of these were from Regina, where 87.2% of the study population was Aboriginal, followed by Edmonton at 70.3%, and Winnipeg at 69.6%. The proportion of Aboriginal IDU in the remaining study population ranged from 5.5% among the SurvUDI participants in Quebec to 27.3% in Sudbury.[5]

- An analysis comparing the seroconversion rates of Aboriginal IDU with those of non-Aboriginal IDU recruited between 1996 and 2000 for the VIDUS study in Vancouver found that Aboriginal IDU were seroconverting at twice the rate of non-Aboriginal IDU.[31]

- The CHASE project is a prospective study in which residents of the Vancouver's Downtown Eastside are recruited. In a subset of CHASE cohort that consisted of IDU, Aboriginal ethnicity was associated with HIV prevalence at baseline.[32]

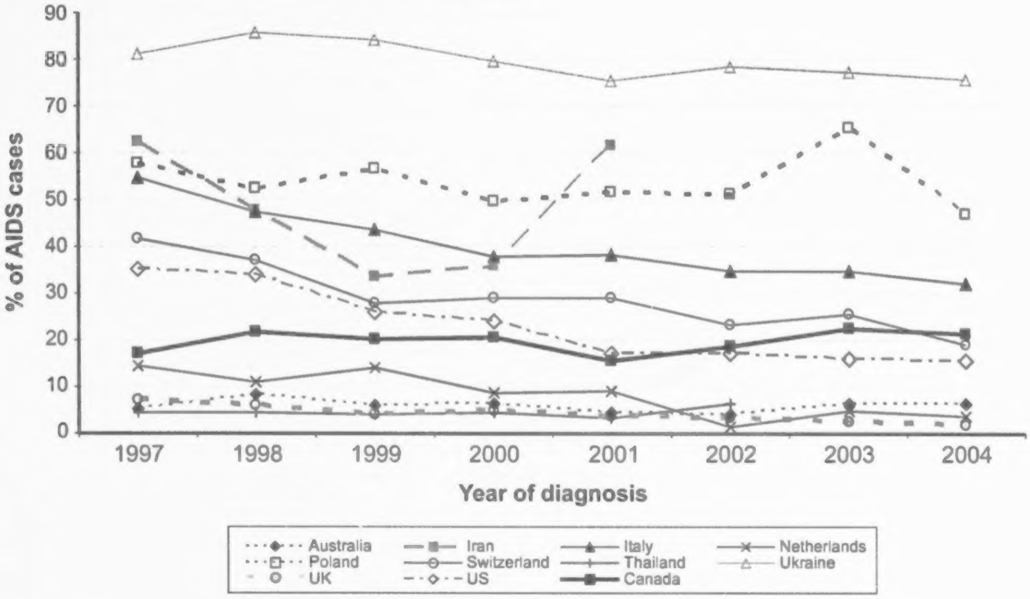
- In a study of the recently opened safe injection facility in Vancouver, 19% of the study participants who were users of the facility were Aboriginal, and Aboriginal ethnicity was significantly associated with HIV seropositive status (odds ratio 2.7, $p < 0.001$).[9]

- In the Cedar Project, a study in Vancouver and Prince George, Aboriginal youth (14-30 years of age) were surveyed about HIV prevalence and risk behaviours, including injecting drug use. Overall HIV prevalence was 4.2% in Prince George and 12.3% in Vancouver. Among injecting Aboriginal youth, HIV prevalence was 7.9% in Prince George and 17.0% in Vancouver.[33] The incidence density in this cohort (between September 2003 and July 2005) was found to be 4.0 per 100 PY in Prince George and 1.6 per 100 PY in Vancouver.[34]

International trends

A report published by UNAIDS and the World Health Organization (WHO) in December 2004 indicated that an estimated 39.4 million people in the world are living with HIV, of whom 2.2 million are children under 15 years of age. IDU is cited as one of the main modes of transmission for those living with HIV/AIDS in seven of the 10 regions of the world, including North America, North Africa and the

Figure 3. Proportion of reported AIDS cases attributed to IDU in selected countries by year of diagnosis



Middle East, Western Europe, and East Asia and Pacific. In Eastern Europe and Central Asia, where the epidemic began relatively later than in other regions (early 1990s), injecting drug use is listed as the single main mode of transmission.[35] Figure 3 shows the proportion of AIDS cases attributed to IDU in selected countries since 1995. While caution should be used when comparing and interpreting data from surveillance systems that may differ, it is interesting to note that although Canada is in the lower half of the graph, countries like Australia, Netherlands, and the UK have even lower proportions of reported AIDS cases attributed to IDU. Such ecological comparisons have their limitations, but this difference may be related to the availability and acceptability of programs and services that advocate harm reduction for IDU populations in these countries. More research is needed to study the effectiveness of these programs and whether similar approaches could be applicable in the Canadian setting.

Sources (accessed January 2005)

- Public Health Agency of Canada, Centre for Infectious Disease Prevention and Control, Surveillance and Risk Assessment Division
  www.phac-aspc.gc.ca/hast-vsmt/index.html
- Centers for Disease Control and Prevention (United States)
  www.cdc.gov/hiv/stats/hasrlink/htm
- National Center in HIV Epidemiology and Clinical Research, The University of New South Wales, Sydney, NSW
  www.med.unsw.edu.au/nchecr
- European Center for the Epidemiological Monitoring of AIDS
  www.eurohiv.org
- UNAIDS/WHO. Epidemiological Fact Sheets on HIV/AIDS and Sexually Transmitted Infections
  www.unaids.org/hivaidsinfo/statistics/fact_sheets/index_en.htm

Comment

A number of biases must be taken into account when interpreting the results given here. HIV diagnostic data are limited to persons who present themselves for testing, and so trends in these numbers may be influenced by testing patterns and/or improved ability to remove duplicate tests. In addition, identifying information that accompanies HIV testing data is sometimes incomplete or inaccurate, and this may limit the usefulness of HIV data. Results of cohort studies are limited by selection biases, loss to follow-up, and problems with generalizability. Studies that have a cross-sectional design have their own respective limitations.

Although the incidence of HIV among IDU may be decreasing somewhat, the issue of HIV among IDU in Canada continues to be a serious problem which demands ongoing attention. The problem is best documented in larger cities, but is increasingly being seen outside major urban areas. The establishment of the I-Track enhanced surveillance system represents a milestone in the objective of describing changing patterns in drug injecting and sexual behaviours, HIV testing behaviours, and HIV and HCV prevalence among IDU in Canada. Results from the I-Track pilot phase and from Phase I suggest that the pattern of drug use and HIV prevalence differs markedly across Canada and within provinces. These findings highlight the importance of expanding the geographic coverage of the surveillance system and the need to include semi-urban centres in the future. Policy and programs to address drug use and HIV will need to be tailored to local issues and IDU migration patterns.

The high levels of risky injecting and sexual behaviours reported by IDU in sentinel sites across Canada suggest that the potential for the transmission of HIV in these populations continues to be significant. Given the geographic mobility of IDU and their social and sexual interaction with non-users, the dual problem of injecting drug use and HIV infection is one that ultimately affects all of Canadian society.

References

1. Boulos D, Yan P, Schanzer D et al. *Estimates of HIV prevalence and incidence in Canada, 2005*. CCDR 2006;32(15) (in press).

2. Public Health Agency of Canada. *HIV and AIDS in Canada: surveillance report to December 31, 2005*. Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, 2006.

3. Choudhri Y, Lydon-Hassen K, Hennink M et al. *I-Track: enhanced surveillance of risk behaviours among injecting drug users in Canada – need for expanded geographic coverage*. Can J Infect Dis 2004;15(Suppl A): 49A(Abstract 301).

4. Health Canada. *I-Track: enhanced surveillance of risk behaviours among injecting drug users in Canada. Pilot survey report*. Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Health Canada, 2004.

5. Public Health Agency of Canada. *I-Track (2003-2005)*. Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, PHAC, unpublished data, April 2006.

6. Regina Health District, Saskatchewan Health, Division of HIV/AIDS Epidemiology and Surveillance, CIDPC, Health Canada. *The Regina Seroprevalence Study: a profile of injection drug use in a Prairie city*. 2000.

7. Millson PE, Challacombe L, WHO Study Team, NEP Study Team, I-Track Study Team. *Trends in HIV prevalence and risk behaviours among Toronto injection drug users since 1992*. Can J Infect Dis 2005;16(Suppl A):35A(Abstract 317P).

8. Elliot LJ, Blanchard JF, Dinner KI et al. *The Winnipeg Injection Drug Epidemiology (WIDE) Study*. Eighth Annual Canadian Conference on AIDS, Vancouver BC May 1-4 1999. Can J Infect Dis 1999;10(suppl B): C314.

9. Tyndall M, Kerr T, Zhang R et al. *HIV prevalence among injection drug users attending the supervised injection site in*

Vancouver. Can J Infect Dis 2005;16 (Suppl A):15A(Abstract 119).

10. Millson PE, Challacombe L, Strike C et al. *HIV and HCV at entry into low threshold methadone programs – prevalence and testing history*. Can J Infect Dis 2004;15 (Suppl A):66A (Abstract 356P).
11. Roy E, Morissette C, Alary M et al. *Hepatitis C among injection drug users in the SurvUDI network*. Can J Infect Dis 2005;16(Suppl A): 33A(Abstract 190).
12. Morissette C, Roy E, Parent R et al and the SurvUDI Working Group. *Temporal trends in HIV incidence and risk behaviours among IDUs in the SurvUDI study 1995-2002*. Can J Infect Dis 2004;15(Suppl A):49A(Abstract 302).
13. Parent R, Alary M, Morrissette C et al. and the SurvUDI Working Group. *Rapport SurvUDI 2003*. Institut national de Santé ublique du Québec, Dec 2003.
14. Noël L, Dumont J, Bradet R et al. *Differences in risk behaviours between injection drug users (IDU) from the needle exchange program (NEP) and IDU from the detoxification centre (DC) at the Québec City site*. Can J Infect Dis 2006;17(Suppl A):51A(Abstract 336P).
15. Parent R, Alary M, Morissette C et al. *Le réseau SurvUDI I-Track : surveillance des maladies infectieuses parmi les utilisateurs de drogue par injection*. Institut national de santé publique du Québec, 2006.
16. Leonard L, Navarro C, Birkett N et al. *The shadow epidemic: high rates of hepatitis C virus incidence among women and men in Ottawa who inject drugs*. Can J Infect Dis 2005;16(Suppl A):71A(Abstract 339P).
17. Burchell A, Calzavara LM, Major C et al. and the Polaris Study Team. *HIV incidence among persons undergoing repeat diagnostic HIV testing in Ontario, 1992-2000*. Can J Infect Dis 2002;13(Suppl A):48A(Abstract 315).
18. Remis RS, Major C, Swantee C et al. *Trends in HIV incidence in Ontario based on the detuned assay: update to December 2002*. Presentation at Ontario HIV Treatment Network, 5th Annual Research Day, Toronto, Ontario, November 3-4, 2003.
19. Remis RS, Swantee C, Fearon M et al. *Enhancing diagnostic data for HIV surveillance: the Ontario Laboratory Enhancement Study (LES)*. Can J Infect Dis 2004; 15(Suppl A):61A(Abstract 342P).
20. Remis RS. *The HIV epidemic in Ontario: 2004 update*. Presented at Ontario HIV Treatment Network Research Conference. November 25, 2004.
21. Tyndall M, Johnston C, Craib K et al. *HIV incidence and mortality among injection drug users in Vancouver – 1996-2000*. Can J Infect 2001;11(Suppl B):69B(Abstract 354P).
22. Miller CL, Spittal P, Frankish JC et al. *Binge drug use independently predicts HIV seroconversion among injection drug users: implications for public health strategies*. Can J Infect Dis 2004;15(Suppl A):65A(Abstract 352P).
23. Lloyd-Smith E, Kerr T, Li K et al. *Frequent needle exchange use and HIV incidence among injection drug users in Vancouver*. Can J Infect Dis 2006;17(Suppl A):49A(Abstract 327).
24. Bruneau J, Zang G, al-Nachawati H et al. *HIV incidence among injection drug users (IDU) in Montreal: the St Luc cohort 1992-2004*. Can J Infect Dis 2006;17(Suppl A):49A(Abstract 328).
25. Spittal PM, Craib KJP, Wood E et al. *Risk factors for elevated HIV incidence rates among female injection drug users in Vancouver*. Can Med Assoc J 2002; 166(7:894-9.
26. Miller C, Tyndall M, Li K et al.. *High rates of HIV positivity among young injection users*. Can J Infect Dis 2001;12(Suppl B):340P.
27. Miller CL, Spittal PM, LaLiberte N et al. *Females experiencing sexual and drug vulnerabilities are at elevated risk for HIV infection among youth who use injecting drugs*. J Acquir Immune Defic Syndr 2002;30(3):335-41.
28. Roy E, Haley N, Leclerc P et al. *HIV incidence among street youth in Montreal, Canada*. AIDS 2003;17(7):1071-5.
29. Health Canada. *Enhanced surveillance of Canadian street youth*. Ottawa: Sexual Health

and STI Section, Community Acquired Infections Division, Centre for Infectious Disease Prevention and Control, Health Canada, 2004.

30. Health Canada. *HIV/AIDS among Aboriginal peoples in Canada: a continuing concern*. HIV/AIDS Epi Updates, May 2004. Ottawa: Surveillance and Risk Assessment Division, CIDPC, Health Canada, 2004.

31. Craib KJP, Spittal PM, Wood E et al. *Risk factors for elevated HIV incidence among Aboriginal injection drug users in Vancouver*. Can Med Assoc J 2003;168(1)19-24.

32. Ishida T, Kerr T, Lai C et al. *HIV infection and related risks among Aboriginal injection drug users in Vancouver, Canada*. 15th International AIDS Conference, Bangkok, Thailand, July 11-16, 2004 (Abstract WePeC6047).

33. Craib KJP, Schechter MT, Medd L et al. *HIV and HCV prevalence and risk factors among young Aboriginal drug users in Vancouver and Prince George, British Columbia*. Can J Infect Dis 2005;16(Suppl A):33A(Abstract 191).

34. Landry S, Alary M, Godin G et al. *Étude de prevalence du VIH et du VHC chez les personnes incarcerées au Québec et pistes pour l'intervention*. Can J Infect Dis 2004;15(Suppl A):50A-51A(Abstract 306).

35. *AIDS epidemic update, December 2004*. Joint United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization (WHO), 2004.

Acknowledgements

National level HIV and AIDS surveillance is possible as a result of all provinces and territories participating in, and setting directions for, HIV and AIDS surveillance. CIDPC acknowledges the provincial/territorial HIV/AIDS coordinators, public health units, laboratories, health care providers, and reporting physicians for sharing non-nominal, confidential data for national surveillance.

For more information, please contact:

Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture
Postal locator: 0602B
Ottawa, ON K1A 0K9
Tel: (613) 954-5169
Fax: (613) 957-2842
www.phac-aspc.gc.ca

Mission

To promote and protect the health of Canadians through leadership, partnership, innovation and action in public health.

Public Health Agency of Canada

Public Health Agency of Canada | Agence de santé publique du Canada

Canada

HIV/AIDS

Epi Update

Centre for Infectious Disease Prevention and Control

Risk Behaviours Among Injecting Drug Users in Canada

Introduction

Recent estimates of national HIV prevalence and incidence indicate that 14% or 350-650 of the estimated 2,300-4,500 new HIV infections that occurred in Canada in 2005 were among injecting drug users (IDU).[1] In 2002, 19% or 400-700 of the estimated 2,100-4,000 HIV infections were among IDU.[1] A comparable trend has been observed in the number of positive HIV test reports attributed to injecting drug use reported to the Centre for Infectious Disease Prevention and Control (CIDPC). The proportion of adult positive HIV tests attributed to injecting drug use, after peaking at just over 33% in 1996 and 1997, gradually decreased to 19.5% in 2005.[2]

Although these declining trends are encouraging, HIV among IDU remains a major concern. In the absence of a vaccine for HIV, behaviour change is the main tool for preventing HIV infection among drug injectors. Behaviour change concerns both IDU who are HIV infected and those who are uninfected, and relates mainly to their injecting-related and sexual behaviour.

In response to a need for ongoing monitoring of HIV-associated risk behaviours in IDU populations, the Public Health Agency of Canada (PHAC), through collaboration with provincial, regional, and local health authorities, community-based organizations, and researchers, has initiated enhanced surveillance of HIV- and hepatitis C (HCV)-associated risk behaviour (I-Track) at sentinel centres across Canada. A pilot study of the I-Track surveillance system was undertaken between October 2002 and August 2003, when a total of 1,062 IDU were surveyed in Victoria, Regina, Sudbury, Toronto, and in Quebec and Ottawa through linkages made with the SurvUDI.[3] Since then Phase I was completed between 2004 and 2005 (2003 in

At a Glance

- ✦ **Available data indicate high levels of risky injecting and sexual behaviours among injecting drug users (IDU), suggesting that the potential for the transmission of HIV in these populations continues to be significant.**
- ✦ **The sharing of needles and other injecting equipment among IDU has shown a decreasing trend across different cities in Canada.**
- ✦ **Marked differences in injecting drug use risk behaviour and in HIV prevalence across different cities in Canada reflect the need to increase the geographic coverage of surveillance of risky behaviours among IDU.**

CIDPC Website:

www.phac-aspc.gc.ca/hast-vsmt/

Victoria), 3,031 subjects being interviewed in Victoria, Edmonton, Regina, Winnipeg, Sudbury, Toronto, and in Quebec and Ottawa through SurvUDI studies.[4]

This *Epi Update* describes the drug injecting and sexual risk behaviours that have been reported by the I-Track surveys, as well as by other studies of IDU in Canada.

Neither a Borrower nor a Lender Be: the Sharing of Needles and Syringes

The sharing (borrowing and lending) of needles and syringes is well established as a means of transmitting HIV infection and is a common behaviour among IDU. While results suggest positive trends in the reduction of sharing behaviour among IDU, the proportion of participants who report sharing needles is still relatively high.

- Results from Phase I of the I-Track survey indicate that, overall, 14.5% of study participants reported injecting with used needles in the 6 months before the survey. Proportions ranged from 8.7% in Edmonton to 26.7% in the SurvUDI network.[4] This is a noticeable drop from the pilot phase of the survey, when 26.8% of participants overall reported injecting with used needles (see Table 1). IDU borrow mostly from people with whom they inject, usually close friends/family or regular sex partners.[3]
- From Phase I, 18.2% of participants overall reported passing or lending a needle/syringe that they had already used to other IDU for injecting purposes, and this proportion ranged from 10.0% in Regina to 31.1% in Victoria.[4] This was slightly lower than the rate from the pilot phase, of 22.7% (see Table 1).[3]
- Recent research from the VIDUS study on accessing addiction treatment found high rates of needle/syringe lending and borrowing in Vancouver. Overall, 37.8% of the participants enrolled in the VIDUS study as of May 2002 reported borrowing syringes (37.4% among those in treatment and 39.6% among those not in treatment). Over one-third of the participants (36.2%) reported lending syringes.[5] In comparison, a survey of IDU attending the safe injection facility in Vancouver found that 11% of the study participants had shared needles/syringes in the previous 6 months. It was also noted, after adjusting for covariates, that the safe injection facility was independently associated with reduced needle/syringe sharing among participants of the survey.[6]
- Researchers in Toronto compared data from the I-Track study with past research on IDU in the city and noted a declining trend in needle sharing. In studies from 1991-94, 1997-98, and 2002, needle borrowing rates were 42.1%, 36%, and 24.1%, and data from Phase I of the I-Track study noted needle borrowing by 15.4% of IDU in Toronto.[7]

Table 1. Sharing of needles in the I-Track survey

Year	Average among sites	Regina	Sudbury	Toronto	Victoria	Quebec	Edmonton	Winnipeg
Used needles								
2004-2005	14.5	9.2	12.0	15.0	18.9	26.7	8.7	10.8
2002-2003	26.8	16.5	26.6	24.0	30.7	36.2		
Lent needles								
2004-2005	18.2	10.0	17.3	20.0	31.1	21.9	12.7	14.4
2002-2003	22.7	15.7	18.3	18.1	30.0	31.4		

- The SurvUDI study in Quebec and Ottawa found a significant distinction between urban and semi-urban (small communities) participants with regard to needle sharing and borrowing: 26.8% of urban participants vs. 36.8% of rural participants had lent used needles to someone in the previous 6 months, and 34.1% of urban participants vs. 42.3% of rural participants had borrowed used needles from someone else in the previous 6 months.[8]

- Among the IDU recruited from shooting galleries in Quebec City, 28.9% of the participants reported injecting with used needles.[9]

- In the Cedar Project, Aboriginal youth from Vancouver and Prince George were surveyed on their drug use and risk behaviours. Study participants from Prince George were more likely to use needles/syringes that had already been used than participants from Vancouver (24% vs. 12%).[10]

- In a study from Ottawa of crack smokers involved with the safe crack kit initiative, subjects who had used crack and injected drugs were more likely to have injected with a used needle than those who did not use crack but did inject (36% vs. 25%).[11]

- Researchers in Quebec City conducted a study that compared risk behaviours among needle-exchange program (NEP) users with risk behaviours among detoxification centre users. Needle sharing and equipment sharing were significantly associated with NEP use, 23.2% of NEP users vs. 17.3% of detoxification centre participants reporting both in the previous 6 months.[12]

The borrowing and lending of other injecting equipment (e.g., spoons, filters, and water), often referred to as "indirect sharing", has also been associated with HIV infection. Research indicates that indirect sharing also occurs frequently among IDU.

- Results from Phase I of the I-Track survey showed that 30.9% of participants reported borrowing the equipment used to prepare drugs for injection (water, filters, cooker/spoon) in the previous 6 six months, and this ranged from 23.5% in Toronto to 40.8% in Regina.[4] This is lower than the rate of borrowing equipment reported in the pilot phase in 2002-03, when 47.0% of study participants (range: 31.8% in Toronto to 58.8% in Sudbury) reported borrowing previously used other injecting equipment (filters, cookers, water) for injecting purposes in the preceding 6 months.[3]

- Also from Phase I of the I-Track survey, 32.0% of participants reported passing or lending the equipment used to prepare drugs for injection that they had already used (water, filter, cooker/spoon). This occurred in from 23.4% in Quebec to 46.8% in Regina.[4] This was a slight change from the pilot phase, when 37.5% reported lending or passing on other injecting equipment in the 6 months prior to the survey.[3]

- In Toronto, analysis of Phase I data of the I-Track survey revealed a decline in injecting equipment sharing when compared with rates from previous research studies. In studies conducted in 1991-94, 1997-98, and 2002, borrowing rates of injecting equipment were 69.1%, 55.6%, and 31.8%, whereas the rate from Phase I was 24%.[7]

- In the VIDUS cohort study of IDU in Vancouver during 1996 to 2000, 38% of men and 37% of women reported borrowing injecting equipment, and it was found to be one of the risk factors for seroconversion among men.[13]

- The sharing of injecting equipment is related to the circumstances and place in which injecting occurs. In a pilot study on social networks of IDU in Quebec City recruited from shooting galleries, 64.4% borrowed other injecting equipment that had been used.[9] In a study conducted between October 2002 and January 2003 among street-recruited IDU in Ottawa, it was observed that the IDU who reported injecting in public places were more likely to inject with used needles.[14]

- International studies[15-17] of IDU have identified other aspects of drug injecting, such as "front-loading" or "back-loading", which may also increase the risk of HIV transmission. These practices involve two or more IDU who use only one syringe to prepare a drug solution. The solution is then squirted into one or more additional syringes either via the front of the recipient syringe after removing its needle (front-loading) or via the back after removing the plunger (back-loading); however, the full extent of such risk behaviours among Canadian IDU is not known.

Risky Business: Trading Unprotected Sex for Money and Drugs

Many IDU in Canada are involved in the commercial sex trade, and studies report inconsistent condom use with clients:

- Among IDU from Phase I of the I-Track survey, 32.1% of females reported having had a client male sex partner in the 6 months before the survey. Of these, 5.7%, 11.0%, and 2.0% reported never using condoms during vaginal, oral, and anal sex respectively.[4]

- Results from the SurvUDI study indicate that, between 1995 and 2005, 42.1% of females and, between 1996 and 2004, 9.2% of males among repeat visit participants reported engaging in prostitution in the previous 6 months.[18] Further, analysis of HCV test results revealed that HCV incidence was significantly associated with sex trade involvement (adjusted hazard ratio 2.61).[19]

- In the VIDUS study in Vancouver, 995 male IDU were recruited between 1996 and 2003, of whom 11% reported being involved in the sex trade at enrolment and 10% initiated sex trade involvement during the follow-up period; those in the sex trade had higher levels of risky injection behaviours.[20]

- Among young IDU in the VIDUS study (IDU under 29 years of age), Aboriginal women and young IDU who started to inject at age 16 years or younger were more likely to be involved in sex trade work.[21]

- In another study focusing on Aboriginal youth, the Cedar Project, researchers looked at IDU risk behaviours and HIV and HCV prevalence rates. Sex trade involvement was reported by 82% of females and 13% of males in Prince George, and 75% of females and 23% of males in Vancouver.[10]

- A study in Montreal of street youth who injected drugs between 1995 and 2000 revealed that 29% of study participants had exchanged sex for money or gifts in the previous 6 months, and 25% had engaged in prostitution as a source of income in the previous 6 months.[22]

Not Safe Enough: Sex with Regular and Casual Partners

Among IDU with regular and casual opposite sex partners, condom use is low:

- Analysis of condom use among participants of Phase I of the I-Track survey indicates that reported condom use during penetrative and oral sex in the preceding 6 months was less frequent with casual sex partners than with client sex partners, and less frequent still with regular sex partners. Among males, 23.0% reported never using condoms for vaginal sex with casual female sex partners. For anal and oral sex, 25.7% and 47.1% respectively reported never using condoms. Of males with casual male sex partners, 23.6% and 41.6% reported never using condoms during anal and oral sex respectively. Among females, 29.4%, 19.9%, and 45.5% reported never using condoms with male casual sex partners for vaginal, anal, and oral sex respectively.

There were no marked differences in reported condom use among participating sites.[4]

- Among IDU in the Regina seroprevalence study conducted in 2000, condom use with regular and casual partners was low. For example, 94% of male IDU and 92% of female IDU reported inconsistent or no condom use during vaginal sex with regular, opposite sex partners. Of those respondents who had casual partners, 58% of men and 71% of women reported inconsistent or no use of condoms with this type of partner.[23]

- In the VIDUS cohort study in Vancouver during 1996-2000, 18% of men and 20% of women reported the use of condoms with regular sex partners in the previous 6 months; non-use of condoms with a regular sex partner was the most significant risk factor for seroconversion among women.[13]

- From VIDUS, an examination of young Aboriginal IDU and risk behaviours revealed that only 21% of young Aboriginal IDU used condoms with regular partners, and 19% used condoms with casual partners; among non-Aboriginal IDU only 16% used condoms with regular partners, and 30% used condoms with casual partners.[24] Of males involved in the sex trade, 17% had unprotected intercourse with regular partners, and 44% had unprotected intercourse with casual partners, whereas among males not involved in the sex trade 19% had unprotected intercourse with intercourse with casual partners.[25]

Male IDU and Same Sex Partners

The proportion of male IDU reporting sexual intercourse with same sex partners varies in different cities:

- In Phase I of the I-Track survey, among male IDU 6.2% reported having had male sex partners in the preceding 6 months.[4]

- Of male IDU in the VIDUS study who reported having had sexual intercourse in the previous 6 months, 7.0% reported having had only same sex partners, and 6.0% reported having had partners of both sexes in this time period.[26]

- In the SurvUDI study, 14.7% of repeat-visit male subjects reported same sex partners between 1995 and 2003.[18]

Protective Behaviour Changes or Higher Risk Practices Following Positive HIV Test?

More research is needed to determine whether IDU continue to engage in high-risk behaviours or modify their behaviours after receiving a positive HIV antibody test:

- Among IDU in a Quebec cohort study conducted between 1996 and 1999, 73.1% of HIV-positive drug injectors had stopped lending needles compared with 56.0% of their HIV-negative counterparts in the 6 months after their HIV serostatus result; however, 8.5% of HIV-positive IDU compared with 16.0% of their non-infected peers began lending needles to HIV-positive partners in this same period. In the same study, 62.2% of HIV-positive drug injectors had stopped borrowing needles compared with 58.6% of their HIV-negative counterparts in the 6 months following their HIV serostatus result. Of HIV-positive IDU, 16.7% compared with 19.5% of their non-infected peers began borrowing needles from HIV-positive partners in this same period.[27]

- In the VIDUS study in Vancouver 35.0% of subjects who were HIV positive reported that they had borrowed needles before learning about their serostatus. In the months after their HIV-positive test, only 21.0% of these subjects reported that they continued to borrow needles. Similarly, 37.0% of HIV-positive IDU reported needle lending before their positive HIV test, whereas only 21.0% of these subjects continued this practice after receiving their positive test results.[28]

- In a study of women in Montreal, the rate of condom use following a positive HIV test was low among IDU (19%) as compared with non-IDU of Haitian origin (30%) and non-IDU of Caucasian origin (62%).[29]

Injecting Drug Use is a Problem Among Street Youth and Inmates

Appropriate and accessible HIV prevention programs for drug injecting, street-involved youth and inmates are clearly needed:

- Results from Phase I of the I-Track survey showed that the mean age of initiation of injecting drug use was 21.8 years in the study population. For males the mean age was 22.1 and for females 21.8. Among males 25.5% and among females 29.9% reported beginning to inject at the age of 16 years or younger.[4]

- Similarly in the VIDUS cohort, 38% of the youth initiated injection drug use at age 16 and under (females, 46% and males 31%).[30]

- In another study from VIDUS on young Aboriginal IDU and risk behaviours, it was revealed that 65% of Aboriginal youth and 59% of non-Aboriginal youth reported unstable housing.[24]

- Results from the Montreal street youth study, 1995 to 2000, of those aged 14 to 25 years show that 47.2% of the study participants had ever injected drugs. Injecting drug use was found to be the strongest indicator of HIV seroconversion.[31]

- The New Montreal Street Youth Cohort Study, a prospective cohort study of street youth aged 14 to 23 years conducted between July 2001 and August 2003, found that of the street youth who were IDU, 33.6% reported injecting with a used needle in the previous 6 months.[32] Among the participants aged 14-17 years recruited between January 1995 and September 2000 in the Montreal Street Youth Cohort study, the incidence rate for initiation of injection drug use was found to be 23.6 per 100 person-years (PY).[33] Combined results from the two Montreal Street Youth studies revealed that 29.4% of recent injectors reported sharing needles, 34.0% reported sharing other injecting equipment, and the sharing of needles and other injecting material showed a decline between 1995 and 2003.[34]

- Of female inmates in a Quebec prison in 1994, 38.0% reported injecting drugs before they were incarcerated, and about half of these women had shared needles. Of those who reported drug injecting before going to prison, 11.0% admitted to injecting drugs during their incarceration, and most (80.0%) shared needles.[35]

- Among male inmates in this same study, 26.0% reported that they had injected drugs before being incarcerated, and about half of these had shared needles. Of those who admitted to injecting drugs outside prison, 2.0% reported injecting drug use during their incarceration, and most (92.0%) shared needles.[35]

- In a study conducted at seven remand facilities in Ontario, the preliminary results from 587 newly admitted inmates up to September 2003 showed that 17.3% of IDU reported lending used injection equipment after having been diagnosed as HCV positive.[36]

- In a study of young offenders in Ontario from February 2003 to July 2004, 5% of the 299 subjects had ever injected drugs. Females were more likely to have injected than males (18% vs. 3.6%), 33% had injected with a used needle, and 31% had passed on a needle that they had already used.[37]

- In the VIDUS study, of 1,475 IDU in Vancouver recruited between May 1996 and May 2002, 76% reported a history of incarceration, and 31% reported ever injecting in prison. Incarceration was independently associated with risky needle sharing for both HIV-positive and HIV-negative IDU.[38]

- In a study of 210 female inmates in Montreal in 1994, 9% of all females and 28% of the females who had a history of injecting drugs and prostitution reported being HIV positive.[39]

- In a multi-centre study conducted in seven detention centres in Quebec in 2003, the prevalence of HIV was estimated at 2.3% and 8.8% among males and females respectively. In the same study, the prevalence of HIV among male and female inmates who reported injecting drugs was found to be 7.2% and 20.6% respectively, and all the female HIV-positive cases were IDU.[40]

- In a study conducted in 13 remand facilities in Ontario in 2003-04, saliva samples from 1,877 newly admitted inmates were tested for HIV. The HIV prevalence was found to be 1.6% among adults and 4.5% among adults who reported injecting drugs. The HIV rates were higher in jails located in the central and eastern regions of the province, and among older age groups.[41]

- In a 1998 study of male inmates at Joyceville and Pittsburgh Institutions, 24.3% of inmates in Joyceville reported injecting drugs (12.0% in 1995) and 7.7% shared injection equipment only inside the prison. In the same study in Pittsburgh, 28.0% reported injecting drug use while incarcerated.[42]

- In a study conducted among inmates in nine provincial jails for women in Canada in 2001-02, 81% of the women reported being sexually active, and 24% reported unprotected sex; 19% reported injecting while incarcerated.[43]

- A study in a provincial women's jail in British Columbia in 2001 revealed that 70% of the inmates reported a history of injecting drugs, and 21% reported injecting in prison, 86% of whom reported sharing needles inside prison.[44]

- In a study conducted in 1996-97 in six provincial jails in Ontario, 32% of participants reported injecting drugs, 25% reported ever injecting while incarcerated, and 17% first injected in a correctional facility, of whom 11% reported injecting drugs while incarcerated in the previous year.[45]

Comment

Although several ongoing regional studies in Canada collect risk behaviour data on IDU, and a large number of one-time, cross-sectional surveys on risk-taking among IDU have been conducted, it is challenging, if not impossible, to compare levels of risk behaviours between data sets. In addition to disparities across study methodologies, different researchers have collected risk behaviour data using different questions or differently worded questions, different variable or concept definitions, different time frames for reported behaviours, and different response categories. Consequently, it is difficult to use available IDU risk behaviour information to identify trends or to help evaluate the effectiveness of prevention programs and policies at more than the regional or local level.

The national HIV estimates for 2005 show a slight decline in the number of new infections attributed to injecting drug use compared with 2002, and during the years 2002-2005 there was a decrease in sharing of used needles by IDU in different cities in Canada, as observed in I-Track studies. In addition, findings from the SurvUDI study in Quebec and Ottawa also point to a decrease in needle sharing and equipment sharing. The continued development of the I-Track Survey will permit improved tracking of injecting and sexual risk behaviours over time and will provide important trend data that could be used to guide prevention program design and that should help evaluate program effectiveness. Such behavioural data could also be used to interpret changes in HIV prevalence and incidence among IDU and would serve as an early warning system for HIV spread in this population. The relatively high levels of risky injecting and sexual behaviours reported by IDU in sentinel sites across Canada suggest that the potential for the transmission of HIV in these populations continues to be significant. Behavioural surveillance of key subgroups of IDU, namely street-involved youth and inmates, is also needed to formulate an appropriate response to the evolving HIV epidemic among IDU in Canada.

References

1. Boulos D, Yan P, Schanzer D et al. *Estimates of HIV prevalence and incidence in Canada, 2005*. CCDR 2006;32(15) (in press).
2. Public Health Agency of Canada. *HIV and AIDS in Canada: surveillance report to December 31, 2005*. Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, 2006.
3. Health Canada. *I-Track: enhanced surveillance of risk behaviours among injecting drug users in Canada*. Pilot survey report. Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Health Canada, 2004.
4. Public Health Agency of Canada. *I-Track (2003-2005)*. Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, PHAC. Unpublished data, April 2006.
5. Wood E, Li K, Palepu A et al. *Sociodemographic disparities in access to addiction treatment among a cohort of Vancouver injection drug users*. Subst Use Misuse 2005;40(8):1153-67.
6. Kerr T, Li K, Tyndall M et al. *Safer injection facility use and syringe sharing among injection drug users*. Can J Infect Dis 2005;16(Suppl A):16A(Abstract 122).
7. Millson P, Challacombe L, Hopkins S et al. *Street injecting in Toronto*. Can J Infect Dis 2006;17(Suppl A):47A-48A(Abstract 322).
8. Parent R, Alary M, Morissette C et al. *Le réseau SurvUDI I-Track : Surveillance des maladies infectieuses parmi les utilisateurs de drogue par injection*. Institut national de santé publique du Québec, 2006.
9. Noël L, Godin G, Alary M et al. *Pilot study on social network of injection drug users (IDU) in shooting galleries (SG) in Quebec City*. Can J Infect Dis 2004;15(Suppl A):56A(Abstract 324).
10. Craib KJP, Schechter MT, Medd L et al. *HIV and HCV prevalence and risk factors among young Aboriginal drug users in Vancouver and Prince George, British Columbia*. Can J Infect Dis 2005;16(Suppl A):33A(Abstract 191).
11. Leonard L, Meadows E, Pelude L et al. *Scaling-up harm reduction for crack-smoking injection drug users indicated for needle exchange programs*. Can J Infect Dis 2006;17(Suppl A):46A(Abstract 318).
12. Noël L, Dumont J, Bradet R et al. *Differences in risk behaviours between injection drug users (IDU) from the needle exchange program (NEP) and IDU from the detoxification centre (DC) at the Québec City site*. Can J Infect Dis 2006;17(Suppl A):51A(Abstract 336P).
13. Spittal PM, Craib KJP, Wood E et al. *Risk factors for elevated HIV rates among female injection drug users in Vancouver*. Can Med Assoc J 2002;166(7):894-99.
14. Navarro C, Leonard L. *Prevalence and factors related to public injecting among injection drug users (IDUs) in Ottawa*. Can J Infect Dis 2004;15(Suppl A):56A(Abstract 325).
15. Koester S. *Following the blood: syringe re-use leads to blood-borne virus transmission among injection drug users*. J AIDS Hum Retrovirol 1998;18:S139.
16. Greenfield L, Bigelow G, Brooner R. *HIV risk behaviour in drug users: increased blood "booting" during cocaine injection*. AIDS Educ Prev 1992;4:95-107.
17. Needle R, Coyle S, Cesari H et al. *HIV risk behaviour associated with the injection process: multi-person use of drug injection equipment and paraphernalia in injection drug user networks*. Subst Use Misuse 1998;33: 2303-423.
18. Parent R, Alary M, Morrissette C et al. and the SurvUDI working group. *Rapport SurvUDI 2003*. Institut national de Santé publique du Québec, Dec. 2003.

19. Roy E, Morissette C, Alary M et al. *Hepatitis C among injection drug users in the SurvUDI network*. Can J Infect Dis 2005;16(Suppl A):33A(Abstract 190).

20. Kuyper LM, Lampinen TM, Li K et al. *Factors associated with sex trade involvement among male participants in a prospective study of injection drug users*. Sex Transm Infect 2004;80(6):531-35.

21. Miller CL, Strathdee SA, Kerr T et al. *Factors associated with early adolescent initiation into injection drug use: implications for intervention programs*. J Adolesc Health 2006;38(4):462-64.

22. Steensma C, Boivin JF, Blais L et al. *Cessation of injecting drug use among street-based youth*. J Urban Health 2005;82(4):622-37.

23. Siushansian J, Hay K, Findlater R et al. *The Regina Seroprevalence Study: a profile of injection drug use in a Prairie city*. Report prepared for the Regina Health District, Division of HIV/AIDS Epidemiology and Surveillance, CIDPC, 2000.

24. Miller CL, Spittal P, Strathdee SA et al. *Elevated rates of HIV infection among young aboriginal injection drug users in a Canadian setting*. Can J Infect Dis 2005;16(Suppl A):68A(Abstract 327P).

25. Kuyper LM, Lampinen TM, Li K et al. *Factors associated with sex trade involvement among male participants in a prospective study of injection drug users*. Sex Transm Infect 2004;80(6):531-35.

26. Tyndall M. *Vancouver response: March 2001*. Presentation made at the Centre for Infectious Disease Prevention and Control, Consultation Meeting on MSM/IDU Data Issues, March 2001.

27. Brogly SB, Bruneau J, Lamothe F et al. *HIV positive notification and behaviour changes in Montreal injection drug users*. AIDS Educ Prev 2002;14(1):17-28.

28. Coulter S, Tyndall M, Currie S et al. *Impact of a positive HIV test on subsequent behaviours among injection drug users*. Presented at the 9th Annual Canadian Conference on HIV/AIDS Research, Montreal, Quebec, April 2000.

29. Hankins C, Gendron S, Tran T et al. *Sexuality in Montreal women living with HIV*. AIDS CARE 1997;9(3):261-71.

30. Miller CL, Spittal P, Frankish JC et al. *Factors associated with early initiation into injection drug use among young injection drug users*. Can J Infect Dis 2004;15(Suppl A):65A (Abstract 352P).

31. Roy É, Haley N, Leclerc P et al. *HIV incidence among street youth in Canada*. AIDS 2003;17(7):1071-75.

32. Roy É, Haley N, Boudreau JF et al. *Needle sharing among young street-based IDUs: need for targeted prevention strategies*. Can J Infect Dis 2004;15(Suppl A):Abstract 326.

33. Roy E, Haley N, Leclerc P et al. *Drug injection among street adolescents – an alarming problem*. Can J Infect Dis 2004;15(Suppl A):65A(Abstract 355P).

34. Roy E, Haley N, Leclerc P et al. *Injection drug use among street youth (SY) – trends over nine years*. Can J Infect Dis 2004;15(Suppl A):65A(Abstract 353P).

35. Dufour A, Alary M, Poulin C et al. *Prevalence and risk behaviours for HIV infection among inmates of a provincial prison in Quebec City*. AIDS 1996;10:1009-15.

36. Ramuscak N, Calzavara LM, Burchell A et al. *Self-reported hepatitis C (HCV) among Ontario inmates: preliminary results from the Ontario remand study*. Can J Infect Dis 2004;15(Suppl A):63A(Abstract 347P).

37. Calzavara L, Ramuscak N, Burchell A et al. *Young offenders and HIV: a chance for prevention*. Can J Infect Dis 2006;17(Suppl A):46A(Abstract 317).

38. Wood E, Small W, Spittal P et al. *Incarceration is independently associated with syringe lending and borrowing among a cohort of injection drug users*. Can J Infect Dis 2004;15(Suppl A):57A(Abstract 327).

39. Guyon L, Brochu S, Parent I et al. *At-risk behaviors with regard to HIV and addiction among women in prison*. Women Health 1999;29(3):49-66.

40. Landry S, Alary M, Godin G et al. *Étude de prevalence du VIH et du VHC chez les*

personnes incarcérées au Québec et pistes pour l'intervention. Can J Infect Dis 2004; 15(Suppl A):50A-51A(Abstract 306).

41. Ramuscak N, Calzavara LM, Burchell A et al. *HIV and hepatitis C (HCV) infection among Ontario inmates: results from the Ontario Remand Study*. Can J Infect Dis 2005; 16(Suppl A):33A(Abstract 192).
42. Ford PM, Pearson M, Bell DM et al. *Risk behaviour in a Canadian federal penitentiary – association with hepatitis C and HIV seroprevalence*. Can J Infect Dis 1999;10 (Suppl B):65B(Abstract C385P).
43. Rehman L, Gahagan J, DiCenso AM et al. *Harm reduction and women in the Canadian national prison system: policy or practice?* Women Health 2004;40(4):57-73.
44. Martin RE, Gold F, Murphy W et al. *Drug use and risk of bloodborne infections: a survey of female prisoners in British Columbia*. Can J Public Health 2005;96(2):97-101.
45. Calzavara LM, Burchell AN, Schlossberg J et al. *Prior opiate injection and incarceration history predict injection drug use among inmates*. Addiction 2003;98(9):1257-65.

Acknowledgements

National level HIV and AIDS surveillance is possible as a result of all provinces and territories participating in, and setting directions for, HIV and AIDS surveillance. CIDPC acknowledges the provincial/territorial HIV/AIDS coordinators, public health units, laboratories, health care providers, and reporting physicians for sharing non-nominal, confidential data for national surveillance.

For more information, please contact:

Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture
Postal locator: 0602B
Ottawa, ON K1A 0K9
Tel: (613) 954-5169
Fax: (613) 957-2842
www.phac-aspc.gc.ca

Mission

To promote and protect the health of Canadians through leadership, partnership, innovation and action in public health.

Public Health Agency of Canada

Public Health Agency of Canada
Agence de santé publique du Canada
Canada

HIV/AIDS
Epi Update
Centre for Infectious Disease Prevention and Control

HIV in Canada Among Persons from Countries where HIV is Endemic

At a Glance

- **Persons from countries where HIV is endemic are over-represented in the HIV/AIDS epidemic in Canada.**
- **HIV infection in persons belonging to the HIV-endemic exposure subcategory is diagnosed at a younger age than in other heterosexual exposure subcategories. Almost 80% of positive HIV test reports occur in individuals under the age of 40.**
- **HIV/AIDS has a significant impact on women from countries where HIV is endemic. Women represented 52% of positive HIV test reports attributed to the HIV-endemic exposure category between 1998 and 2005 and 41% of AIDS cases during this same time period.**

CIDPC Website:

www.phac-aspc.gc.ca/hast-vsmt/

Introduction

The risk of HIV transmission through unprotected anal and vaginal intercourse is well documented. Estimates of the probability of per-sex-act (receptive penile-anal intercourse with ejaculation) HIV transmission among homosexual men in the USA range from 0.005 to 0.03 during the asymptomatic phase of infection[1] to as high as 0.1-0.3 during primary HIV infection.[2] Analyses of data from North American and European studies of long-term heterosexual couples estimate the per-sex-act probability of HIV transmission through penile-vaginal intercourse to be approximately 0.001;[3] however, the independent risk of HIV transmission through oro-genital contact has been more difficult to study and is not as well understood.

The Joint United Nations Programme on HIV/AIDS (UNAIDS) estimated that at the end of 2005, the total number of people living with HIV/AIDS was 38.6 million (33.4-46.0 million) worldwide.[1] HIV and AIDS is affecting some countries more than others. Most countries with high rates of HIV/AIDS are exhibiting generalized epidemics, meaning that HIV is spreading throughout the general population rather than being confined to specific populations at higher risk (such as men who have sex with men and injecting drug users).[1] In countries with these generalized epidemics, HIV is mainly spread through heterosexual contact.

The Centre for Infectious Disease Prevention and Control (CIDPC) maintains a list of countries with generalized epidemics and refers to these countries as "HIV-endemic countries" for the purpose of surveillance. HIV-endemic countries are generally defined as those that have an adult prevalence (ages 15-49) of HIV that is 1.0% or greater and one of the following:

- 50% or more of HIV cases attributed to heterosexual transmission;
- a male to female ratio of 2:1 or less; or
- HIV prevalence greater than or equal to 2% among women receiving prenatal care.

Examples of regions where HIV prevalence among adults is greater than 1% are sub-Saharan Africa (7.4%, or 25.4 million people) and the Caribbean (2.3%, or 444,000 people).[1] A list of HIV-endemic countries appears in Appendix A of this *Epi-Update*; note that this list is in the process of being updated according to recent data on HIV epidemiology at the country level.

This *Epi Update* provides the most current information on the status of the HIV/AIDS epidemic in Canada among persons from countries where HIV is endemic and is the product of collaboration between the Surveillance and Risk Assessment Division (SRAD) of CIDPC, Public Health Agency of Canada (PHAC), and the HIV-Endemic Working Group.* The data in the report are drawn from voluntarily submitted provincial and territorial surveillance data on positive HIV test reports and diagnosed AIDS cases from 1998 to the end of 2005.

Background

People from Countries where HIV is Endemic

In Canada, the proportion of the population born in a country where HIV is endemic is 1.5%, according to the 2001 Census.[2] Relative to other provinces, Ontario and Quebec have a larger proportion of individuals born in countries where HIV is endemic, representing 2.6% and 1.3% of the provincial populations, respectively.[2] Within these provinces, there are concentrations of individuals born in countries where HIV is endemic in such urban centres as Toronto (4.9%), Ottawa (2.9%), and Montreal (2.4%).[2] The community of persons from countries where HIV is endemic is actually larger than what is captured by Census data, particularly when Canadian-born descendents of persons born in HIV-endemic countries are considered.

The communities of people from countries where HIV is endemic are diverse, reflecting variations in historical backgrounds, language, and cultural traditions. Unfortunately, these communities are disproportionately affected by many social, economic, and behavioural factors that not only increase their vulnerability to HIV infection but also act as barriers to accessing prevention, screening, and treatment programs. Two community surveys[3,4] conducted in African and Caribbean communities and among service providers found that such factors as racism, homelessness, transience, poverty, underemployment, settlement and status concerns presented barriers to program access. Other barriers identified by the surveys included fear and stigma; denial as a coping mechanism; social isolation; lack of social support; job loss; fear of deportation; discrimination; power relations; and cultural attitudes and sensitivities about HIV/AIDS transmission, homosexuality, status of women, and sex/sexuality.[3-7] In addition to these barriers, the surveys also found that there is a lack of culturally competent and accessible services because of the location of services, language barriers, and the fact that health care may not be free depending on immigration status. Stigma, the isolation of HIV-positive individuals, and cultural and linguistic barriers to treatment were also identified as particularly critical issues by members of five East African communities in Toronto.[8-10]

---

* The HIV-endemic Working Group comprises representatives from community groups (specifically, the African and Caribbean Council on HIV and AIDS in Ontario and GAP-Vies in Montreal), public health departments, academia and CIDPC. Members of the working group were from the following geographic areas: British Columbia, Ontario (Toronto and Ottawa), Quebec (Montreal) and Nova Scotia. Working group members helped to select the content of this publication and were an integral part of the review process.

HIV and AIDS Surveillance

The ability to adequately monitor the HIV/AIDS epidemic among persons from countries where HIV is endemic requires accurate and complete access to key data elements, specifically, country of birth and ethnicity. These data elements are collated at the national level and provide information on ethnic categories (for example, White, Black, North American Indian) and country of birth. Information on country of birth can be categorized according to the HIV-endemic country list that appears in Appendix A. Unfortunately, the completeness of these data elements across Canada is variable.

For HIV surveillance data, there are a limited number of cases with complete data on country of birth and ethnicity: less than 10% of records are submitted with country of birth data, and ethnicity data accompany approximately one-third (29.1%) of positive HIV test reports. Two of Canada's largest provinces, Ontario and Quebec, do not routinely collect and/or report country of birth data or ethnic information on their positive HIV tests. This is a limitation for conducting surveillance, as these two provinces together account for over two-thirds of all positive HIV test reports. They also include two large urban centers (specifically, Toronto and Montreal) that are ethnically diverse. The lack of country of birth and ethnicity data impairs the ability to accurately describe the HIV/AIDS epidemic among ethnic subgroups. Reported AIDS cases are more complete for both fields. Data on country of birth are available for half of all cases and ethnicity data for 79.7% of reported AIDS cases.

Because of the limited coverage of these two data elements, CIDPC also uses exposure category information to monitor the HIV/AIDS epidemic within this population. The term "exposure category" refers to the most likely way a person became infected with the HIV virus and is assigned according to a hierarchy of exposure categories.[†] The first four exposure categories are men who have sex with men (MSM), injecting drug users (IDU), recipients of blood/blood products (before 1985), and heterosexual contact. These first three exposure categories are generally accepted to be higher risk activities than heterosexual activity, and so if these are present they are assumed to be the likely route of HIV acquisition.

The category most relevant to this discussion is the HIV-endemic subcategory of the broader "heterosexual contact" exposure category. The HIV-endemic exposure subcategory was first reported to CIDPC as its own category in 1998. In addition to this subcategory, other subcategories within the heterosexual contact classification include "sexual contact with a person at risk" (HET-RISK) (such as an injecting drug user or a bisexual male) and "no identified risk – heterosexual" (NIR-HET) (cases in which no HIV risks were reported except for a history of heterosexual sex). When using these exposure categories to monitor the HIV/AIDS epidemic in this population, it is important to consider that only those individuals from HIV-endemic countries who have been exposed to HIV/AIDS through heterosexual contact are captured, and those who may have been exposed through other risks, such as MSM and IDU, are excluded. While much of the transmission within this population is through heterosexual contact, Remis and Merid[11] provide evidence that a non-negligible proportion of HIV-infected men in Ontario from regions where HIV is endemic reported having had sex with other men (refer to the section HIV/AIDS Incidence and Prevalence Estimates Among Persons from Countries where HIV is Endemic, later in this document).

[†] Even though all risk factors associated with a positive HIV test report are reported to CIDPC, only one exposure category is assigned for national HIV/AIDS surveillance reporting. A person reporting more than one HIV-related risk factor will be placed in the exposure category corresponding to the activity or situation that is considered to have the highest risk of HIV transmission. The exposure category hierarchy appears in Appendix B.

Although exposure category data are more complete than data on country of birth or ethnicity, they are nonetheless incomplete. Exposure category information accompanies only 53% of positive HIV test reports at the national level, although it is more complete for AIDS cases, 95% of case reports providing these data. Since June 30, 2003, there have been limitations associated with AIDS data. Such data have not been available from the province of Quebec since this time, and AIDS data from Ontario do not include exposure category or ethnicity data for the second half of 2005 because of a change in an information technology application affecting all reportable diseases. Because of the large amount of missing data and the fact that the HIV-endemic exposure category does not include all persons from countries where HIV is endemic, the surveillance data presented in this report cannot provide a representative national picture of the HIV/AIDS epidemic among persons from HIV-endemic countries. Caution should be used when making conclusions based on the percentages and frequencies in this document, as many estimates are based on small numbers.

HIV and AIDS Surveillance Data

The Proportion of HIV Test Reports Attributed to the HIV-Endemic Exposure Category Is on the Rise

From 1998 to 2005, there were 18,322 positive HIV test reports and 3,444 AIDS cases among persons aged 15 years and over, reported to CIDPC. Table 1 summarizes surveillance data for the heterosexual contact exposure category for positive HIV test reports and AIDS cases with exposure category information during the years 1998-2005. Of these reports, the HIV-endemic exposure subcategory amounted to 560 positive HIV test reports and 376 AIDS cases, accounting for 5.9% and 12.8% of reports with exposure category information, respectively.

For HIV surveillance data, the absolute number of positive test reports in the HIV-endemic exposure subcategory increased from 35 in 1998 to a peak of 107 in 2004 (Figure 1). In 2005, this exposure category accounted for 88 positive test reports. The proportion of overall positive test reports attributed to the HIV-endemic category increased from 2.9% in 1998 to 7.7% in 2005.

Although the absolute number of AIDS cases attributed to the HIV-endemic exposure category has decreased over time (from 59 in 1998 to 42 in 2004), the proportion has increased, from 9.7% in 1998 to 16.3% in 2004 (Figure 2). AIDS data are not shown for 2005 because of limited exposure category data.

The increases in positive HIV test reports observed in the HIV-endemic exposure category could be due to a true increase in new infections among individuals born in HIV-endemic countries, better reporting in this exposure category by the provinces and

Table 1. Proportion and number of cases from the heterosexual exposure category, from 1998 to 2005

	Positive HIV test reports (*n* = 9,450*)	AIDS cases (*n* = 2,945*)
Exposure category	**Percentage (number)**	**Percentage (number)**
Heterosexual contact	**30.0% (2,832)**	**29.5% (869)**
HIV-endemic	5.9% (560)	12.8% (376)
HET-RISK	14.0% (1,326)	7.3% (216)
NIR-HET	10.0% (946)	9.4% (277)

**n* = number of cases with available information on exposure categories

Figure 1. Number of positive HIV test reports attributed to the HIV-endemic exposure category and proportion of all HIV-positive test reports by year (1998-2005)

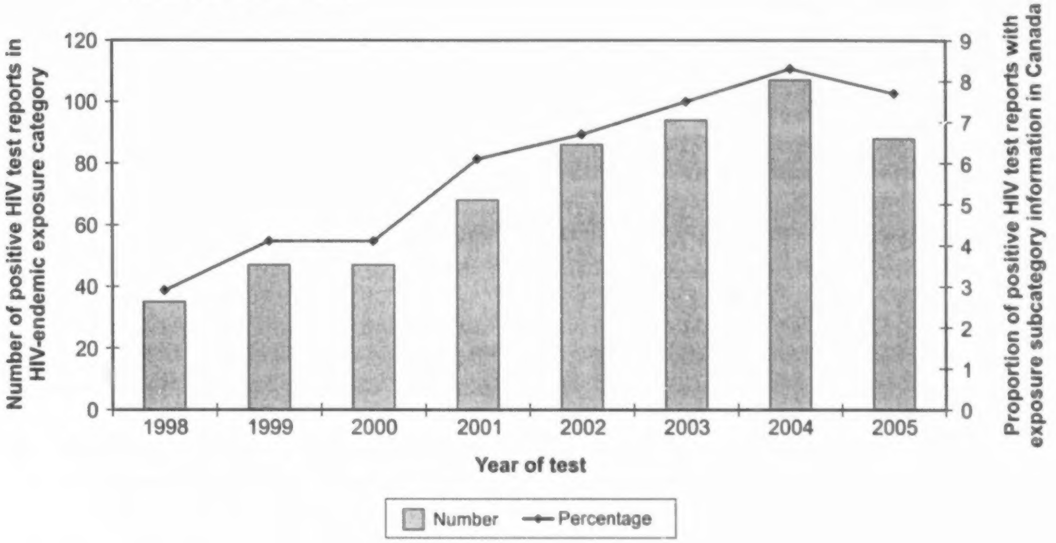
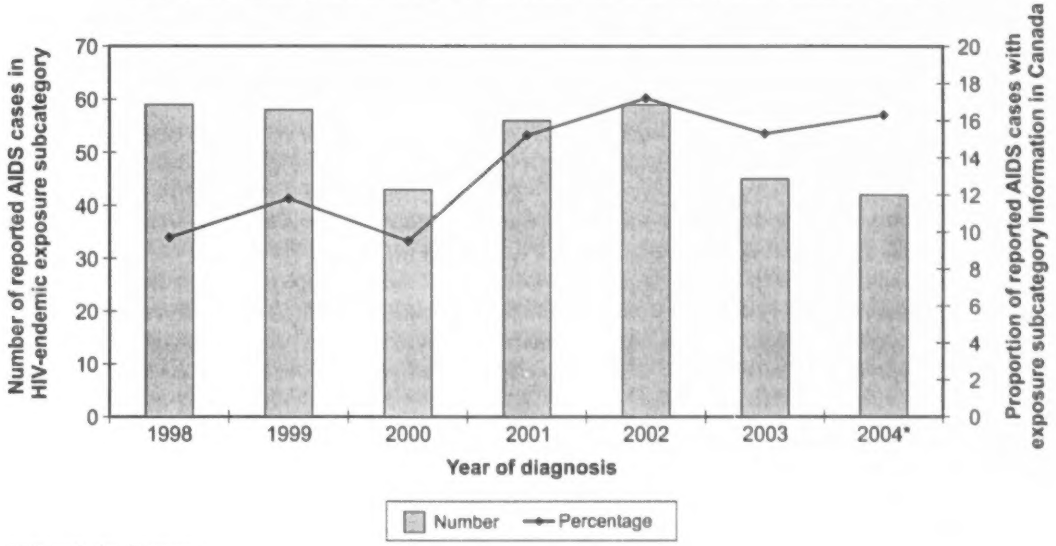


Figure 2. Number of reported AIDS cases attributed to the HIV-endemic exposure category and proportion of all AIDS cases by year (1998- 2004)



* Data excludes Quebec.

territories, or increased HIV testing in this population. Increased testing is at least partly responsible for the increase as a result of the recent policy of Citizenship and Immigration Canada (CIC) whereby immigrants and refugees are tested for HIV for the purposes of counselling (refer to the section entitled Immigration and HIV/AIDS Surveillance). In fact, similar trends have been observed in other countries with large number of immigrants born in countries where HIV is endemic (such as the United Kingdom).[12] Data from 12 countries in the European HIV surveillance network suggest that between

12

1997 and 2002 there was an increase in the number of cases diagnosed in people originating in countries with generalized HIV epidemics (an increase of 179%, from 1,382 to 3,861 diagnosed cases).[13] The trends were largely driven by the U.K., which accounted for 30% of the population and about 40% of the HIV diagnoses reported in the 12 countries during that period. It is not a surprise that the U.K. accounts for a large proportion of HIV diagnoses since that country has a large population born in HIV-endemic countries.[12,14,15]

A Substantial Proportion of Positive HIV Test Reports and AIDS Cases in the HIV-Endemic Exposure Category Occur in Younger Age Groups

When the HIV-endemic exposure subcategory is broken down by age, some important findings emerge. Of positive HIV test reports attributed to this subcategory, 79.4% occurred in those aged less than 40 years (34.6% among those < 30 years and 44.8% among those aged 30-39). Almost half (44.1%) of the AIDS cases attributed to the HIV-endemic exposure subcategory were between the ages of 30 and 39; another 13.6% were under the age of 30. Together, these two age groups accounted for just over half (57.7%) of the AIDS cases within the HIV-endemic exposure category.

When compared with other subcategories within the larger heterosexual contact exposure category, the greatest contrast in age distribution was for AIDS (Figure 3). Those ≤ 39 years old accounted for 57.7% of AIDS cases in the HIV-endemic exposure subcategory as compared with 42.1% of cases in the HET-RISK subcategory and 43.0% in the NIR-HET subcategory.

A similar trend can be seen for positive HIV test reports: a substantial number in the HIV-endemic exposure subcategory occurred in younger age groups when compared with other subcategories in the heterosexual contact exposure category. Figure 4 shows that 80% of positive HIV test reports in the HIV-endemic exposure category occurred among those ≤ 39 years old. This age group accounted for 60% of test reports in the HET-RISK subcategory and 71.6% of test reports in the NIR-HET exposure subcategory.

Figure 3. Age distribution of AIDS cases among the heterosexual contact exposure subcategories (1998-2005)

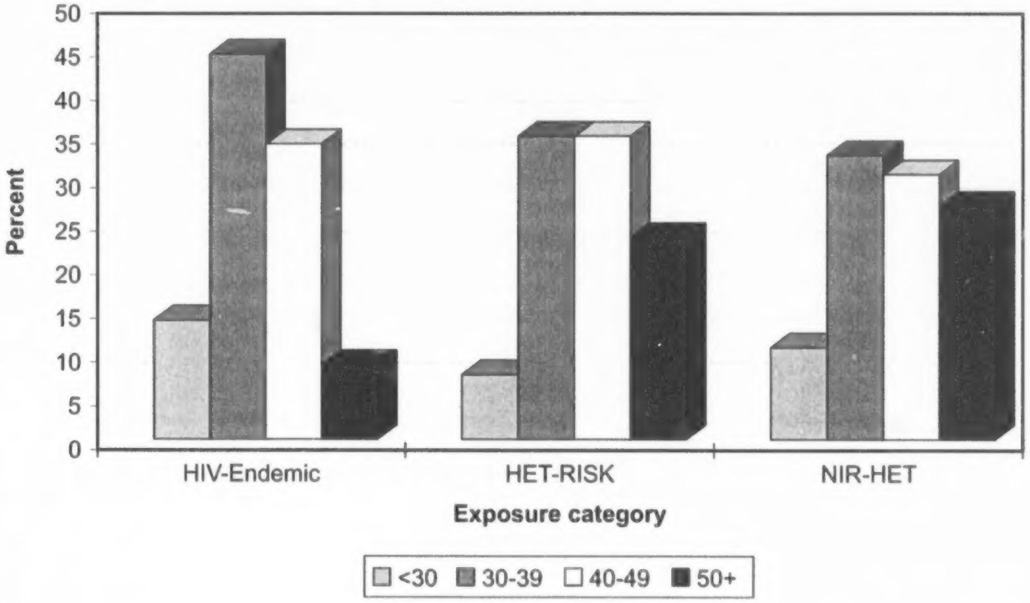
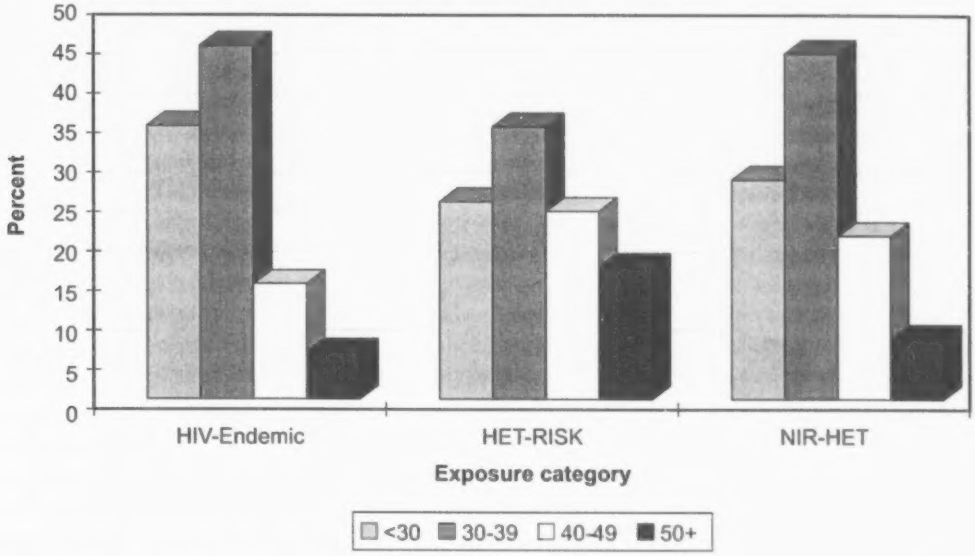


Figure 4. Age distribution of postive HIV test reports among the heterosexual contact exposure subcategories (1998-2005)



The large proportion of positive HIV test reports in younger age groups in this exposure subcategory suggests that, compared with others infected through heterosexual contact, persons in the HIV-endemic exposure category are infected at a younger age. These findings can act as early warnings for public health practice, since they indicate that HIV prevention and control programs could be more effective if targeted to a younger audience.

Ethnicity Within the HIV-Endemic Exposure Subcategory

Of the 305 positive HIV test reports belonging to the HIV-endemic exposure subcategory with information on ethnicity, 90.8% identified themselves as Black, 3.7% as Asian, 2.9% as Other, and 2.6% as White. Among similarly defined AIDS cases, 86.8% identified themselves as Black, 6.0% as Asian, 5.2% as Other, and 2% as White.

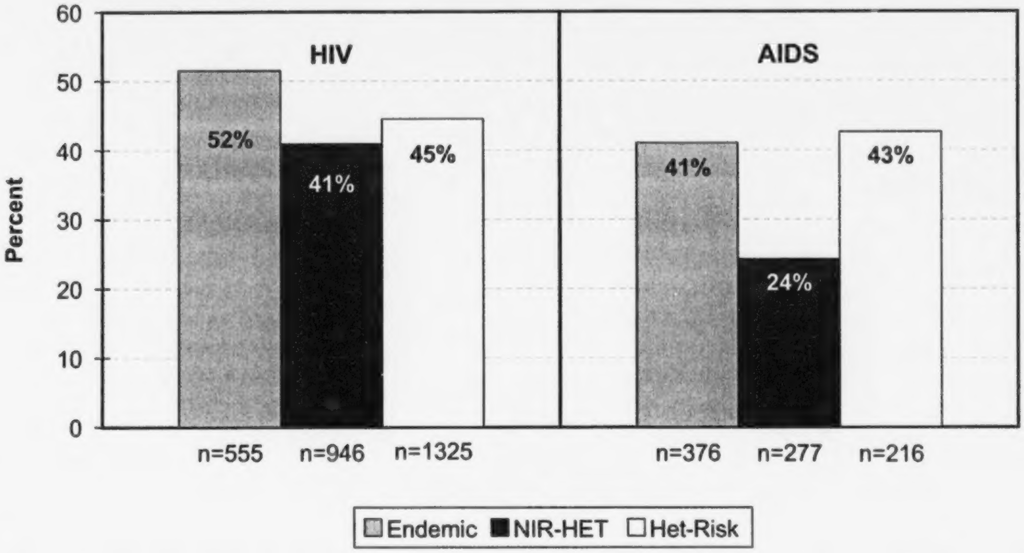
Two of Canada's largest provinces, Ontario and Quebec, do not provide ethnic information on positive HIV test reports to the national level. This is a limitation for monitoring the epidemic among persons from countries where HIV is endemic, as the two provinces together account for over two-thirds of all positive HIV test reports; as well, they include two large urban centres, namely Toronto and Montreal, that contain large proportions of people from countries where HIV is endemic.

Women Represent over Half of Those in the HIV-Endemic Exposure Category

Between 1998 and 2005, women accounted for 286 positive HIV test reports and 154 AIDS cases within the HIV-endemic exposure subcategory. Figure 5 demonstrates the proportion of positive HIV test reports and AIDS cases accounted for by women in the heterosexual contact subcategories.

Women accounted for 51.5% of all positive HIV test reports attributed to the HIV-endemic exposure subcategory. For the other heterosexual contact subcategories women also accounted for a substantial proportion of cases: 44.5% of the HET-RISK subcategory and 40.9% of the NIR-HET subcategory. For AIDS surveillance data, women accounted for 41.0% of AIDS case reports within the HIV-endemic exposure subcategory, as compared with 42.6% and 24.2%, respectively, of the HET-RISK and NIR-HET subcategories. However, these data are based on small numbers.

Figure 5. Proportion of positive HIV test reports and AIDS cases attributed to females for the heterosexual contact exposure subcategories (1998-2005)



As discussed in the Introduction, there are a number of health determinants (such as poverty) that influence vulnerability to HIV infection and access to services within the community. While women from countries where HIV is endemic are affected by many of these determinants, it has been proposed that certain subpopulations (such as women and refugees) are especially marginalized and made more susceptible to these barriers.[16]

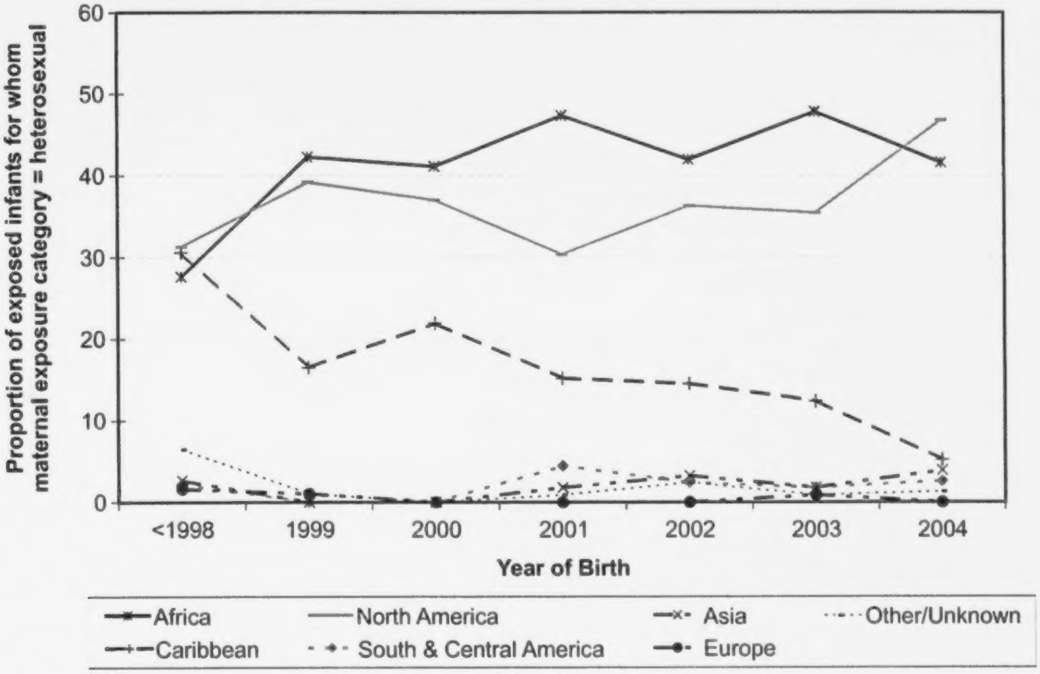
Women of Childbearing Age and Perinatal Transmission

Since women account for a substantial number of positive HIV test reports in the HIV-endemic exposure subcategory, and since the HIV epidemic appears to be affecting younger persons in this subcategory, it is important to consider women of childbearing age (ages 15 to 44) and the potential for perinatal HIV transmission. Each year a number of infants are perinatally exposed to HIV because of the positive HIV status of their mothers. The Canadian Perinatal HIV Surveillance Program collects data on the HIV status of such infants through a national, non-nominal confidential survey on infants known to pediatricians in tertiary care centres and HIV specialists in clinics across Canada. The Canadian Pediatric AIDS Research Group (CPARG) conducts surveillance on such exposures, on access to preventive treatment, and actual infections that occur following exposure.

Figure 6 summarizes data on the maternal country of birth for infants in Canada who were perinatally exposed to HIV and for whom the maternal exposure category was heterosexual contact. Before 1998, three regions accounted for approximately 90% of exposures: North American-born mothers accounted for 31% of exposures, followed by Caribbean-born mothers at 31% and African-born mothers at 28%. By 2004, there were increases in the proportion of exposures attributed to North American and African-born mothers, accounting for 47% and 42% respectively. The proportion of exposure attributed to Caribbean-born mothers decreased to 5% of all exposures.

When interpreting these data, it is important to note that the data presented in this section are based on infants born to women who were known to be HIV positive. The numbers presented do not reflect all infants perinatally exposed to HIV infection, as not all pregnant

Figure 6. Region of birth of mothers in the heterosexual exposure category whose infants were perinatally exposed to HIV (1984-2004)



women are aware of their HIV status. Also, the region of birth data presented by CPARG does not break down the sub-Saharan regions of Africa.

Although all provinces and territories in Canada promote voluntary HIV testing of pregnant women and women considering pregnancy, there is variation in how this policy is implemented across jurisdictions. For more information on perinatal transmission, refer to the *Epi Update* entitled Perinatal Transmission of HIV, in this document.

HIV-1 Strains

The SRAD recently released a report on the distribution of HIV-1 strains based on 2,759 samples that were collected between the years 1986 and 2005.[17] Overall, the vast majority of positive samples were of the B group as compared with the non-B group HIV-1 strain (88.3% and 11.7% respectively). However, the HIV-endemic exposure subcategory accounted for the highest proportion of non-B group HIV-1, at 82.8% of tests in this exposure category.

The high concentration of non-B group HIV-1 strains in the HIV-endemic exposure subcategory has been supported by an Ontario study by Njihia and colleagues[18] that used some of the data from the SRAD. These data were based on samples collected between October 2003 and October 2004. The HIV-endemic subcategory had the highest proportion (77.3% or 17 out of 22 samples) of the non-B group strain. The researchers also looked at the distribution of strains by region of birth and found that 91.5% of HIV positive persons born in North America had B group HIV-1, as compared with 86.7% of persons born in sub-Saharan Africa with the non-B group. Clearly, strain type is related to country of birth, which in turn is related to the fact that non-B strains predominate in Africa and other regions of the world outside of North America, Europe and Australia/New Zealand.

The observed difference in strains between the HIV-endemic and all other exposure categories has several public health implications for prevention, detection and treatment of

HIV/AIDS. As the diversity of HIV subtypes continues to shift, it will invariably create a public health challenge to ensuring that existing diagnostic tests detect all subtypes, including the various non-B strains. In addition, information on strain type will help direct future vaccine development and will help assess the utility of any future vaccine for the specific situation found in Canada.[19]

Immigration and HIV/AIDS Surveillance

On January 15, 2002, Citizenship and Immigration Canada (CIC) added routine HIV testing for all applicants who require an Immigration Medical Examination (IME) and are aged 15 years and over, as well as for those children who have received blood or blood products, have a known HIV-positive mother, or are potential adoptees. In June 2002, *the Immigration and Refugee Protection Act* (IRPA) was implemented, requiring that applicants be assessed for inadmissibility on the basis of health care needs. However, certain groups were exempted from IRPA, such as refugees and family-class immigrants. Further information on this legislation is available on the CIC Web site (www.cic.gc.ca).

Between January 15, 2002, and December 31, 2005, approximately 2,000 applicants tested positive for HIV during their IME (CIC: personal communication, February 9, 2006). In 2005, about 668 applicants who underwent an IME tested HIV positive:

- 389 were identified through testing in Canada, and 279 were identified outside of Canada; and
- 432 (64.7%) were born in Africa and the Middle East, 155 (23.2%) in the Americas, 57 (8.5%) in Asia, and 24 (3.6%) in Europe.

For the HIV screening conducted in Canada, most provinces and territories handle positive HIV test reports in the same manner as all other positive HIV tests and include them in provincial/territorial HIV reporting to CIDPC. The 668 positive HIV test reports identified in 2005 represent 15.7% of the 2,483 positive HIV tests reported to CIDPC.

HIV/AIDS Incidence and Prevalence Estimates Among Persons from Countries where HIV is Endemic

National HIV surveillance data may understate the magnitude of the HIV epidemic because such data are subject to reporting delays, underreporting, and changing patterns in HIV testing behaviours (who comes forward for testing); surveillance data also do not include individuals who remain untested and undiagnosed. Since HIV is a chronic infection with a long incubation period, many newly infected persons may only be diagnosed in the years after infection. Consequently, the number of new HIV positive tests reported to CIDPC in a given year does not estimate the new HIV infections that occurred in that year because many will have been infected in earlier years.

Since surveillance data can only describe the diagnosed portion of the epidemic, modelling and additional sources of information are required to describe the epidemic among both diagnosed and undiagnosed Canadians. The methods used to estimate the total number of people living with HIV (prevalence) and the number newly infected with HIV (incidence) at the national level bring together all available data, including national HIV surveillance data.

At the end of 2005, an estimated 58,000 (48,000 to 68,000) people in Canada were living with HIV infection (including AIDS).[20] It was also estimated that the HIV-endemic exposure subcategory comprised approximately 7,050 (5,200-8,800) of these prevalent HIV infections, representing about 12% of all prevalent infections in Canada.

An estimated total of 2,300 to 4,500 new HIV infections occurred in Canada in 2005.[20] New infections attributed to the HIV-endemic exposure subcategory increased slightly from a range of 300 to 600 (15% of total) in 2002 to 400 to 700 (16%) in 2005. According to the 2001 Census, approximately 1.5% of the Canadian population were born in an HIV-endemic country.[3] Therefore, the estimated infection rate among individuals from HIV-endemic countries is at least 12.6 times higher than among other Canadians. With the methods and available data used to estimate incidence in Canada, it was not possible to differentiate infections acquired abroad from those acquired in Canada. CIDPC is currently collaborating with other government departments, provincial/territorial partners, researchers and community groups to develop methods and obtain data to better understand the current status and trends of HIV infection in this group. As an example, Remis and Merid[11] completed a modelling exercise to try to differentiate the sources of infection in Ontario, and their results suggest that 20%-60% of new infections in the HIV-endemic group in Ontario occurred after arrival in Canada. Distinguishing between HIV infections acquired abroad from those acquired within Canada is important not only to accurately measure incidence but also to more effectively guide prevention and care programs.

As previously mentioned, these estimates pertain only to HIV-infected persons from countries where HIV is endemic and with heterosexual contact as their exposure category. Persons from these countries who would fall into other exposure categories are not included in the incidence and prevalence estimates, and the number of such persons is likely not insignificant. For example, using mathematical modeling, Remis and Merid[11] have estimated that in 2002 there were 2,627 persons from HIV-endemic regions (1,366 from sub-Saharan Africa and 1,261 from the Caribbean) living with HIV infection and residing in Ontario, and an estimated 400 or more were from the MSM exposure category.

In 1999, Adrien et al.[21] estimated the prevalence of HIV infection among Montrealers of Haitian origin in a clinic-based epidemiologic study of 5,039 persons aged 15 to 49 years who were either born in Haiti or had at least one parent who was born in Haiti. Overall, the HIV prevalence in this population was 1.3% (1.6% among men and 1.1% among women) and was lower among those born in Canada and those who had had a longer residence in Canada. These data further illustrate the over-representation of persons from HIV-endemic countries in Canada's HIV epidemic.

In 2005, Remis et al.[22] developed a statistical model to characterize the HIV epidemic from 1981 to 2002 among persons in Quebec who originated from countries of the Caribbean and sub-Saharan Africa. As of December 2002, the authors estimated that 2,946 persons from HIV-endemic regions residing in Quebec were living with HIV infection (2,553 from the Caribbean and 393 from sub-Saharan Africa). The largest number of HIV-infected persons were from Haiti (2,298), Zaire (113), Rwanda (67), Jamaica (62), and Trinidad (53). These five countries represented 88% of HIV-infected persons living in Quebec who were from HIV-endemic countries. The estimated HIV prevalence among persons from the Caribbean in 2002 was 3.2% but varied from 1.0% to 4.2% by country. Similarly, for persons from sub-Saharan Africa, the overall HIV prevalence was 1.4%, but this varied from 0.37% to 8.0% by country. It is important to note that the methods used in this study have limitations, including lack of data for some components of the model (such as data from HIV-infected mothers), incomplete Quebec AIDS data for recent years, and potential confusion in the data in relation to name changes of countries (such as Zaire/Congo and Eritria/Ethiopia).

Comment

Limitations

This report has summarized HIV and AIDS surveillance data for persons belonging to the HIV-endemic exposure subcategory of the broader heterosexual category. It should be reiterated that because of the limitations mentioned earlier surveillance data may understate the magnitude of the HIV epidemic, because such data are subject to reporting and can only describe the diagnosed portion of the epidemic. Of the estimated prevalent infections in 2005, about 15,800 (11,500 to 19,500) or 27% were unaware of their HIV infection. This compares with an estimated 14,400 (10,700 to 17,900) or 29% who were living and unaware of their HIV infection in 2002.[20] In addition, information on some variables in the surveillance data was incomplete, which affects the interpretation of the diagnosed portion of the epidemic. Reliance on the HIV-endemic exposure subcategory does not capture information on persons from countries where HIV is endemic who are assigned to an exposure category higher up in the hierarchy (such as MSM or IDU). Further limitations to the HIV/AIDS surveillance data are detailed in *HIV and AIDS in Canada: Surveillance Report to December 31, 2005.*[23]

Interpretation

Despite the limitations associated with surveillance data, a picture emerges regarding the pattern of the HIV/AIDS epidemic among persons from countries where HIV is endemic. The observed trends suggest that there is an increasing proportion of reported HIV and AIDS cases attributed to this group, which appears to be over-represented in the Canadian HIV epidemic. Furthermore, those particularly affected include persons under the age of 40 and women, including women of childbearing age. Most of the people associated with the HIV-endemic exposure subcategory identify themselves as being of Black ethnicity.

Public Health Implications

There is a need for improved HIV/AIDS surveillance data at the national level to permit better monitoring and characterization of trends in HIV among persons from HIV-endemic countries, which will in turn provide better data to guide prevention and care programs for this group. To accomplish this, CIDPC is strengthening its collaboration with provincial/territorial governments and community stakeholders specifically to find ways to improve the quality of information on exposure category and ethnicity for the population born in countries where HIV is endemic. It is also important that further research in this area is developed to better understand the reasons behind these observed trends and to assess the best way to address them. More complete surveillance and research information would enable policy makers, public health officials, and community members to jointly develop, implement and sustain culturally relevant prevention, education and support services for this population across Canada.

References

1. UNAIDS. *Joint United Nations Programme on HIV/AIDS: 2006 report on the global AIDS epidemic.* May 2006.

2. Statistics Canada. *2001 Canada's ethno cultural portrait: the changing mosaic.* Census Analysis series. Ottawa: Statistics Canada, January 21, 2003.

3. HIV Endemic Task Force (HEFT). *Strategy to address issues related to HIV faced by people in Ontario from countries where HIV is endemic.* December 2003.

4. HIV Endemic Task Force (HEFT). *Summary report of the community forum "For Us, By Us, About Us": an opportunity for African and Caribbean communities to address the issue of HIV/AIDS related stigma and denial.* November 2001.

5. Interagency Coalition on AIDS and Development. *HIV/AIDS and African and Caribbean communities in Canada.* URL: <http://www.icadcisd.com/pdf/publications/e_afr_carr_web.pdf>. Accessed July 20, 2005.

6. Tharao E, Massaquoi N, Teclom S. *Executive summary. "Silent voices of the AIDS epidemic": African and Caribbean women, their understanding of the various dimensions of HIV/AIDS and factors that contribute to their silence.* URL: <http://www.whiwh.com/Research/Silentvoicesexecutivesummary.doc>. Accessed July 20, 2005.

7. Tharao E, Massaquoi N. *Black women and HIV/AIDS: contextualizing their realities, their*

silence and proposing solutions. Canadian Women's Studies 2000;21.

8. Hyman I. Applied Research and Analysis Directorate (ARAD). Immigration and Health. Website: <http://www.hc-sc.gc.ca/iacb-dgiac/arad-draa/english/rmdd/wpapers/immigration01.html>. Accessed July 20, 2005.
9. Tharao E, Calzavara L, Myers T. *What service providers need to know to provide effective HIV/AIDS programs and services for African immigrants in Canada: findings from the East African HIV/AIDS Study.* Int Conf AIDS 2000;13:abstract no. MoPpD1051.
10. Calzavara L, Tharao E, Myers T. *HIV/AIDS in East African communities living in Toronto: results of a feasibility study, final report. Toronto.* Toronto: HIV Social, Behavioural and Epidemiological Studies Unit, Faculty of Medicine, University of Toronto, 2000.
11. Remis RS, Merid MF. *The HIV/AIDS epidemic among persons from HIV-endemic countries in Ontario: update to December 2002.* June 8, 2004. Toronto: Ontario HIV Epidemiologic Monitoring Unit. URL: <http://www.phs.utoronto.ca/ohemu/mandate.html>.
12. Del Amo J, Brõring G, Hamers FH et al. *Monitoring HIV/AIDS in Europe's migrant communities and ethnic minorities.* AIDS 2004;18:1867-73.
13. Hamers F, Downs A. *The changing face of the HIV epidemic in western Europe: What are the implications for public health policies?* Lancet 2004;364: 83-94.
14. Sinka K, Mortimer J, Evans B et al. *Impact of the HIV epidemic in sub-Saharan Africa on the pattern of HIV in the UK.* AIDS 2003;17:1683-90.
15. Fenton KA, Chinouya M, Davidson O et al. *HIV testing and high risk sexual behavior among London's migrant African communities: a participatory research study.* Sex Transmit Infect 2002;78:241-45.
16. Public Health Agency of Canada. *The Federal Initiative to Address HIV/AIDS in Canada. Environmental scan.* URL: <http://www.phac-aspc.gc.ca/aids-sida/hiv_aids/federal_initiative/direction/csha/1.2.html>.
17. Public Health Agency of Canada. *HIV-1 strain and primary drug resistance in Canada: surveillance report to March 31, 2004.* Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, 2005.
18. Njihia J, Remis R, Swantee C et al. *Distribution of HIV status among persons newly diagnosed with HIV in Ontario, 2003-2004.* Can J Infect Dis Med Microbiol 2005;16 (Suppl A):67A.
19. Public Health Agency of Canada. *HIV-1 strain surveillance in Canada: surveillance report to March 31, 2005.* Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, 2006.
20. Boulos D, Yan P, Schanzer D et al. *Estimates of HIV prevalence and incidence in Canada, 2005.* CCDR 2006;32(15) (in press).
21. Adrien A, Leaune V, Remis RS et al. *Migration and HIV: an epidemiological study of Montrealers of Haitian origin.* Int J STD AIDS 1999;10:237-42.
22. Remis RS, Merid MF, Adrien A. *The epidemiology of HIV infection among persons from HIV-endemic countries in Quebec, 2002.* Toronto: Ontario HIV Epidemiologic Monitoring Unit, Department of Public Health Sciences, University of Toronto, and Regional Department of Public Health Montreal, Quebec, 2005.
23. Public Health Agency of Canada. *HIV and AIDS in Canada: surveillance report to December 31, 2005.* Ottawa: Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control. Public Health Agency of Canada, 2006.

APPENDIX A
HIV-ENDEMIC COUNTRY LIST*

Caribbean:

Anguilla
Antigua and Barbuda
Bahamas
Barbados
Bermuda
British Virgin Islands
Cayman Islands
Dominica
Dominican Republic
Grenada
Guadeloupe
Haiti
Jamaica
Martinique
Montserrat
Netherland Antilles
Saint Lucia
St. Kitts and Nevis
St. Vincent and the Grenadines
Trinidad and Tobago
Turks and Caicos
U.S. Virgin Islands

South America:

French Guiana

Africa:

Angola
Benin
Botswana
Burkina Faso
Burundi
Cameroon
Cape Verde
Central African Republic
Chad
Congo
Dahomey
Equatorial Guinea
Ethiopia
Gabon
Gambia
Ghana
Guinea-Bissau
Guinea
Ivory Coast
Kenya
Lesotho
Liberia
Madagascar
Malawi
Mali
Mozambique
Namibia
Niger
Nigeria
Rwanda
Senegal
Sierra Leone
Somalia
Sudan
Swaziland
Tanzania
Togo
Uganda
Zaire
Zambia
Zimbabwe

*This HIV-endemic country list is currently used for national HIV/AIDS surveillance. It is in the process of being updated.

APPENDIX B
EXPOSURE CATEGORY HIERARCHY

HIV and AIDS cases are assigned to a single exposure category according to a hierarchy of risk factors. If more than one risk factor is reported, a case is classified as the exposure category listed first (or highest) in the hierarchy. For example, injecting drug users (IDU) may also be at risk of HIV infection through heterosexual activity. Injecting drug use is accepted as the higher risk activity even though there may also be risk of HIV infection through sexual activity. The only exception to this is men who are reported to have had sex with men (MSM) and to have also injected drugs. Such cases are classified in the combined exposure category MSM/IDU.

Exposure Categories

The exposure categories are defined as follows.

MSM: Men who have had sex with men; this includes men who report either homosexual or bisexual contact.

MSM/IDU: Men who have had sex with men and have injected drugs.

IDU: Injecting drug users.

Blood/blood products:

a) **Recipient of blood/clotting factor:** Before 1998, it was not possible to separate this exposure category. However, where possible, it has been separated into subcategories b and c.

b) **Recipient of blood:** Received transfusion of whole blood or blood components, such as packed red cells, plasma, platelets or cryoprecipitate.

c) **Recipient of clotting factor:** Received pooled concentrates of clotting factor VIII or IX for treatment of hemophilia/coagulation disorder.

Heterosexual contact:

a) **Origin from an HIV-endemic country/ sexual contact with a person at risk:** Before 1998, it was not always possible to separate this exposure category. However, where possible, it has been separated into subcategories b and c.

b) **Origin from an HIV-endemic country:** People who were born in a country where HIV is endemic (i.e. a country in which the predominant means of HIV transmission is heterosexual contact).

c) **Sexual contact with a person at risk:** People who report heterosexual contact with someone who is either HIV-infected or who is at increased risk of HIV infection (i.e. injecting drug user, bisexual male, or a person from an HIV-endemic country).

d) **NIR-HET:** If heterosexual contact is the only risk factor reported and nothing is known about the HIV-related factors associated with the partner, the case would be classified as *No Identified Risk-Heterosexual* (NIR–HET).

Occupational exposure: Exposure to HIV-contaminated blood or body fluids, or concentrated virus in an occupational setting. This applies only to reported AIDS cases and not occupational positive HIV test reports, which are listed under "Other".

Perinatal transmission: The transmission of HIV from an HIV-infected mother to her child either *in utero,* during childbirth, or through breastfeeding.

Other: Used to classify cases in which the mode of HIV transmission is known but cannot be classified into any of the major exposure categories listed here – for example, a recipient of semen from an HIV-positive donor.

NIR (No Identified Risk): The history of exposure to HIV through any of the modes listed is unknown, or there is no reported history. This exposure category may include cases that are currently being followed up by local health department officials; people whose exposure history is incomplete because they died, declined to be interviewed, or were lost to follow-up; and people who cannot identify any mode of transmission.

Exposure Category Not Reported: In certain provinces, it is not possible to report information regarding exposure category; such cases are thus classified as *Not reported.* This applies only to positive HIV test reports and not to reported AIDS cases.

Acknowledgements

National level HIV and AIDS surveillance is possible as a result of all provinces and territories participating in, and setting directions for, HIV and AIDS surveillance. CIDPC acknowledges the provincial/territorial HIV/AIDS coordinators, public health units, laboratories, health care providers, and reporting physicians for sharing non-nominal, confidential data for national surveillance.

For more information, please contact:

Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture
Postal locator: 0602B
Ottawa, ON K1A 0K9
Tel: (613) 954-5169
Fax: (613) 957-2842
www.phac-aspc.gc.ca

Mission
To promote and protect the health of Canadians through leadership, partnership, innovation and action in public health.
Public Health Agency of Canada

Public Health Agency of Canada
Agence de santé publique du Canada

Canada

HIV/AIDS
Epi Update
Centre for Infectious Disease Prevention and Control

HIV-1 Strain Surveillance in Canada

At a Glance

- **The Canadian HIV Strain and Drug Resistance Surveillance Program (SDR program) monitors and assesses HIV strains and the transmission of drug resistance among individuals with newly diagnosed but untreated HIV infection in Canada.**
- **Although HIV-1 strain B continues to predominate in Canada (88.3% of samples analysed), a wide variety of non-B strains have also been identified (11.7% of samples analysed).**
- **On the basis of results from the SDR program, the likelihood of a non-B strain infection was greater among individuals of African/Caribbean origin than Caucasians and greater among those whose primary risk exposure was heterosexual sex than among those with male-to-male sex as the primary risk exposure.**
- **HIV strain variation is part of the changing nature of the HIV epidemic in Canada. It is therefore important to implement the systematic collection and analysis of data related to strain surveillance across the country.**

CIDPC Website:

www.phac-aspc.gc.ca/hast-vsmt/

Introduction

Two types of HIV have been characterized in humans, HIV-1 and HIV-2. HIV-2 is less common than HIV-1 and is found mainly in west Africa. Both HIV-1 and HIV-2 can lead to AIDS, and differences in their transmission and biologic characteristics are well documented.[1] However, HIV-1 is primarily responsible for the AIDS pandemic. It can be divided into three major groups: "M" (major), "O" (outlier), and "N" (new).[2] The vast majority of HIV strains are clustered in the M group, which is classified into subtypes (A-D, F-H, J, and K), sub-subtypes, as well as circulating recombinant forms (e.g. AB).[3-5]

According to the WHO-UNAIDS Network for HIV Isolation and Characterization, in 2000, 47.2% of diagnosed infections worldwide were due to HIV-1 subtype C.[6] This subtype predominates in India, southern Africa, and Ethiopia. HIV-1 subtype A (including the circulating recombinants AE and AG) was the second most commonly identified, accounting for 30% of diagnosed infections worldwide. Subtype A and the recombinant AG predominate in western and central Africa, whereas the recombinant AE is more commonly found in Thailand, China, the Philippines, and central Africa. Other recombinant forms accounted for 18% of diagnosed infections. Overall, HIV-1 subtype B was responsible for 12.3% of diagnosed infections worldwide, although it predominates in Canada, the United States and western Europe. However, because of travel and migration, non-B subtypes are increasingly being reported in these parts of the world. Additional subtypes and recombinant forms are constantly being discovered, largely as a result of travel and migration of populations.[7]

This *Epi Update* describes why surveillance of HIV strains is important and provides a summary of the prevalence of divergent HIV strains in Canada identified through the Canadian SDR program.

13

Why Conduct HIV Strain Surveillance?

The SDR program was initiated as an integrated group of projects aimed at enhancing the national surveillance of HIV. Through a collaborative approach between the provinces and the Public Health Agency of Canada (PHAC), laboratory samples (serum from treatment-naïve individuals with newly diagnosed HIV infection) and corresponding epidemiologic data are sent from the provincial health laboratories to PHAC for HIV strain and drug resistance testing. The results are then shared with provincial and other stakeholders. One of the central goals of this program is to conduct the systematic surveillance of HIV subtypes in Canada in order to attain the following four main objectives.

1. **Improve HIV Diagnostics and Screening Strategies**

   The broad genetic diversity of HIV has implications for the ability of diagnostic tests to reliably detect circulating HIV strains. The sentinel arm of the SDR program, through the reference services of the National HIV and Retrovirology Laboratories, addresses this goal by testing samples with unusual test results. On the basis of knowledge of the circulating HIV strains, modifications can be made to current tests to ensure that all HIV-positive persons are detected upon testing. This is also relevant to the safety of the blood supply, since the tests used for screening donated blood should be able to detect circulating HIV variants.

2. **Inform Vaccine Development**

   It is important to know the distribution of the viral subtypes and intra-subtype variation to target vaccine development and testing, since the efficacy and effectiveness of vaccines may be subtype-specific.[8]

3. **Assess HIV Transmission Patterns**

   Although genetic analyses have been used to assess the spread of HIV globally, there is little consensus on whether differences in HIV subtype affect sexual[9-11] and maternal transmission rates.[12-15] Some studies note differences in the biological properties of HIV-1 subtypes.[11,14,16] Knowing the distribution of HIV variants in Canada, along with corresponding epidemiologic factors, will help to assess the implications of any differences in transmissibility. The public health implications of such findings, including prevention and treatment strategies, are of special interest.

4. **Assess HIV Pathogenesis and Progression of HIV-related Diseases**

   Although the rate of HIV-related disease progression is affected by many factors, including host factors, evidence suggests that the immunologic responses may be less suppressed by HIV-2 than by HIV-1;[16-18] this needs to be clarified. Whereas some studies suggest that genetic subtypes play a role in disease progression, other studies suggest the reverse. Many of these studies are reviewed by Tatt et al[8] and Hu et al.[19] Lastly, while recent evidence suggests that currently available antiretroviral drugs are equally effective against all HIV subtypes, certain subtypes or viruses from particular geographic regions may have a higher propensity to develop resistance against specific antiretroviral drugs.[20,21]

Distribution of HIV-1 Subtypes in Canada

- HIV-1 subtype A was first reported in 1995 from an individual of African origin.[22]
- HIV-2 was detected in Canada as early as 1988.[23]
- Results from the SDR program show that while HIV-1 subtype B continues to predominate, 11.7% of the sampled population (*n* = 2,759) were infected with non-B subtypes (see Table 1 for subtype distribution).

Results from the SDR program suggest that a significant proportion of individuals infected with a non-B HIV-1 subtype are female (com-

Table 1. Distribution of HIV-1 subtypes in samples submitted to the SDR program

HIV-1 Subtype	Frequency	Percentage
B	2,437	88.3
C	180	6.5
A	47	1.7
AG	28	1.0
AE*	24	0.9
AD	13	0.5
D	12	0.4
BD	4	0.14
G	3	0.11
AB	2	0.07
BC	2	0.07
AC	1	0.04
B/AG	1	0.04
F	1	0.04
H	1	0.04
K	1	0.04
K/AE	1	0.04
K/AG	1	0.04
Total	**2,759**	**100**

pared with males), are younger in age at initial diagnosis, are among those of African/Caribbean background (compared with Caucasians and those of other ethnicities), and reported heterosexual sex as their primary risk factor (compared with male-to-male sex).

Comment

The introduction of variant HIV strains into Canada is most likely related to travel and migration patterns from regions of the world where non-B HIV-1 strains predominate. As the diversity of HIV increases, it will invariably challenge existing diagnostic tests and interpretation algorithms. Depending on the impact that strains have on vaccine effectiveness and efficacy, it may direct the course of future vaccine research and testing. Furthermore, depending on future findings related to strain-specific transmissibility, pathogenicity, and treatment, HIV strain variation may play a role in changing the nature of the HIV epidemic in Canada. It is therefore important to implement the systematic collection and analysis of data related to strain surveillance across Canada.

References

1. De Cock KM, Adjorlolo G, Ekpini E et al. *Epidemiology and transmission of HIV-2. Why there is no HIV-2 pandemic.* JAMA 1993;270: 2083-86.
2. Simon F, Mauclere P, Roques P et al. *Identification of a new human immunodeficiency virus type distinct from group M and group O.* Nature 1996;4:1032-37.
3. Robertson DL, Anderson JP, Bradac JA et al. *HIV-1 nomenclature proposal.* Science 2000;288(5463):55-6.
4. McCutchan FE. *Understanding the genetic diversity of HIV-1.* AIDS 2000;14:S31-S44.
5. Peeters M, Sharp PM. *Genetic diversity of HIV-1: the moving target.* AIDS 2000;14:S129-40.
6. Osmanov S, Pattou C, Walker N et al. *Estimated global distribution and regional spread of HIV-1 genetic subtypes in the year 2000.* J Acquir Immune Syndr 2002;29:184-90.
7. Perrin L, Kaiser L, Yerly S. *Travel and the spread of HIV-1 genetic variants.* Lancet 2003;3:22-7.
8. Tatt ID, Barlow KL, Nicoll A et al. *The public health significance of HIV-1 subtypes.* AIDS 2001;15(Suppl 5):S59-S71.
9. Kanki PJ, Travers KU, Mboup S et al. *Slower heterosexual spread of HIV-2 than HIV-1.* Lancet 1994;343:943-6.
10. Mastro TD, de Vincenzi I. *Probabilities of sexual HIV-1 transmission.* AIDS 1996;10 (suppl A):S75-S82.
11. Kunanusont C, Foy HM, Kreiss JK et al. *HIV-1 subtypes and male-to-female transmission in Thailand.* Lancet 1995;345(8957):1078-83.
12. Adjorlolo-Johnson G, De Cock KM, Ekpini E et al. *Prospective comparison of mother-to-*

child transmission of HIV-1 and HIV-2 in Abidjan, Ivory Coast. JAMA 1994;272(6):462-66.

13. Shaffer N, Roongpisuthipong A, Siriwasin W et al. *Maternal viral load and perinatal human immunodeficiency virus type 1 subtype E transmission, Thailand*. J Infect Dis 1999; 179:590-99.
14. Renjifo B, Fawzi W, Mwakagile D et al. *Differences in perinatal transmission among human immunodeficiency virus type 1 genotypes*. J Hum Virol 2001;4(1):16-25.
15. Renjufi B, Gilbert P, Chaplin B et al. *Preferential in-utero transmission of HIV-1 subtype C compared to HIV-1 subtype A or D*. AIDS 2004;18(12):1629-36.
16. Hu DJ, Vanichseni S, Mastro TD et al. *Viral load differences in early infection with two HIV-1 subtypes*. AIDS 2001;15(6):683-91.
17. Pepin J, Morgan G, Dunn D et al. *HIV-2 induced immunosuppression among asymptomatic West African prostitutes: evidence that HIV-2 is pathogenic, but less so than HIV-1*. AIDS 1991;5:1165-72.
18. Whittle H, Morris J, Todd J et al. *HIV-2 infected patients survive longer than HIV-1 infected patients*. AIDS 1994;6:803-7.
19. Hu DJ, Buve A, Baggs J et al. *What role does HIV-1 subtype play in transmission and pathogenesis? An epidemiological perspective*. AIDS 1999;13:873-81.
20. Wainberg, MA. *HIV subtype distribution and the problem of drug resistance*. AIDS 2004; 18(suppl 3):S63-8.
21. Kantor R, Katzenstein D. *Drug resistance in non-B HIV-1*. J Clin Virol 2004;29:152-59.
22. Montpetit M. *HIV-1 subtype A in Canada*. AIDS Res Hum Retroviruses 1995;11(11):1421-22.
23. Neumann PW, Lepine D, Woodside M et al. *HIV-2 infection detected in Canada*. Can Dis Wkly Rep 1988;14(28):125-26.

Acknowledgements

National level HIV and AIDS surveillance is possible as a result of all provinces and territories participating in, and setting directions for, HIV and AIDS surveillance. CIDPC acknowledges the provincial/territorial HIV/AIDS coordinators, public health units, laboratories, health care providers, and reporting physicians for sharing non-nominal, confidential data for national surveillance.

For more information, please contact:

Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture
Postal locator: 0602B
Ottawa, ON K1A 0K9
Tel: (613) 954-5169
Fax: (613) 957-2842
www.phac-aspc.gc.ca

Mission

To promote and protect the health of Canadians through leadership, partnership, innovation and action in public health.

Public Health Agency of Canada

Public Health Agency of Canada
Agence de santé publique du Canada

Canada

HIV/AIDS
Epi Update
Centre for Infectious Disease Prevention and Control

Primary HIV Antiretroviral Drug Resistance in Canada

At a Glance

- **The Canadian HIV Strain and Drug Resistance Surveillance Program (SDR program) monitors and assesses HIV strains and the transmission of HIV drug resistance among individuals with newly diagnosed but untreated HIV infection in Canada.**
- **Preliminary observations from the SDR program of HIV drug resistance among treatment-naïve individuals with newly diagnosed HIV infection in Canada (i.e. primary drug resistance) are as follows:**
  - **The overall prevalence of primary drug resistance to at least one antiretroviral drug is 8.6%.**
  - **The overall prevalence of multi-drug resistance to two or more classes of antiretroviral drugs is 1.4%.**
  - **Primary drug resistance has been observed in both females and males, across different age groups, ethnicities, and exposure categories, in HIV-1 subtype C and recombinant subtype infections, and among recent and established HIV infections.**
- **The prevalence of primary drug resistance is similar to what has been observed in other countries where highly active antiretroviral treatment (HAART) is widely used.**

CIDPC Website:

www.phac-aspc.gc.ca/hast-vsmt/

Introduction

Drug resistance in individuals receiving treatment (secondary drug resistance) is well documented. Resistance observed in treatment-naïve individuals with newly diagnosed HIV infection, in whom resistance is presumably due to the transmission of a drug-resistant variant of HIV-1 (primary drug resistance), is less well understood; however, there is increasing evidence to suggest that transmission of drug-resistant strains of HIV is becoming more widespread in most countries where HAART is used. Currently, there are 22 antiretroviral drugs that have been approved or are soon to be approved for the treatment of HIV-1 infection in Canada. Drug resistance complicates the treatment of HIV, has important implications for HIV-related morbidity and mortality, and may result in increased health care costs.

Drug Resistance in Treated Individuals

In Canada and the United States, the prevalence of drug resistance among treated individuals infected with HIV-1 subtype B may be as high as 78%.[1] The development of resistance to these drugs is a result of a combination of virologic treatment failure and incomplete viral suppression. Given the extensive literature and sequence data from treated individuals infected with HIV-1 subtype B, patterns of mutations associated with resistance to specific drugs have become increasingly recognizable, making it possible to recommend alternative treatment regimens; however, such data are generally not available for non-B subtypes.

Drug Resistance in Untreated Individuals

Detection of mutations associated with drug resistance in individuals with newly diagnosed but untreated infection is thought to be the result of the transmission of drug resistance from a treated individual. Several studies from Europe and the United States have reported mutations associated with drug resistance in up to 20% of untreated, early or acute HIV-1 infections;[2-6] but, in general, little is known about mutations associated with drug resistance in non-B subtypes. Recent studies suggest that genotypic differences between B and non-B subtypes may lead to the identification of previously unidentified mutations associated with drug resistance in non-B subtypes as well as differences in long-term outcomes of antiretroviral therapies.[7-9] Associated trends over time are not well understood either.

Why Conduct Primary Drug Resistance Surveillance?

Although HAART has led to a reduction in HIV-1-related morbidity and mortality in Canada and many other countries, there is a concern that its widespread use, the increased number of treatment failures, and continuing risk behaviour may result in increased transmission of drug-resistant virus. The first case of primary drug resistance was reported in 1993 with the transmission of a zidovudine-resistant HIV-1 strain.[10] Since then, many reports of transmission of drug-resistant HIV strains have been published, and there is increasing evidence to suggest that the proportion of new HIV infections involving drug-resistant strains may be increasing in countries where HAART is routinely used.

Less well understood is the prevalence of primary drug resistance and the variation of this prevalence over time, geographic area, and population risk group. The SDR program aims to address these questions, and the resulting information will help inform the development of any guidelines for initial therapeutic regimens and more effective HIV prevention strategies, including the prevention of vertical transmission.

Evolution of Drug Resistance

Viral resistance develops largely as a result of changes (mutations) in the genetic material that codes for the HIV reverse transcriptase (RT) and protease enzymes. Both of these enzymes are required for viral reproduction, and current antiretroviral drugs interact with them to impede their activity. Although new drugs are continually being developed, the most commonly used antiretroviral drugs that are approved for treatment of HIV infection fall into three classes: nucleoside reverse transcriptase inhibitors (NRTIs), non-nucleoside reverse transcriptase inhibitors (NNRTIs), and protease inhibitors (PIs).

Most mutations are lethal or neutral and are not associated with development of drug resistance; however, under conditions in which treatment does not completely inhibit viral replication, virus with drug-resistant mutations can develop and replicate, resulting in treatment failure. In general, it is theoretically possible for every single drug-resistant mutation to be generated daily. For some drugs (e.g. NNRTIs), a single mutation is associated with a high level of drug resistance to multiple drugs.

Methods to Identify Drug Resistance

Genotypic tests identify mutations in the viral genetic material through commercially available probes for particular mutations or through sequencing of viral genes of interest. By comparing the generated sequences with databases containing resistance-conferring mutations, the presence or absence of drug resistance can be identified.

Phenotypic tests determine the enzymatic activity of viral genes or assess viral growth in increasing concentrations of drugs. Resistance is usually defined when the amount of drug required to inhibit viral growth by 50% is four or more times greater than that required to achieve the same result in a wild-type strain. This test is similar in concept to antibiotic-resistance testing in bacterial culture.

Note: Genotypic and phenotypic testing and interpretation for patient care are evolving fields that are extremely complex, requiring expert input.

Summary of Key Studies on the Prevalence of Primary Drug Resistance

Table 1 illustrates results obtained from several Canadian studies on primary drug resistance. It is important to note that drawing firm conclusions from inter-study comparisons is difficult because of differences in study design, including study populations, types of resistance testing used, and the specific mutations studied and reported.

Table 2 shows the results of studies on primary drug resistance that were conducted in the United States and in western Europe. Again, this table is not meant for inter-study comparisons for the reasons given earlier. The results suggest that the prevalence of major mutations associated with at least one antiretroviral drug is similar to that in Canada. It is of note that mother-to-child transmission of resistance to zidovudine and nevirapine or of multi-drug resistant HIV-1 has been reported in the United States and France.[16,17]

Please see the following pages for Tables 1 and 2.

Table 1. Summary of key studies on HIV-1 primary drug resistance in Canada

Province*	Year of diagnosis	Risk exposure**	Sample size	RTIs† (%)	Protease inhibitors (%)	Multi-drug resistance (%)	Total (%)
BC[11]	1996-1998	Mixed	423	1.9	1.9	0.2	3.5
QC[12]	1997-1999	IDU (26%) Sexual (69%)	81	20	6	9.9	-
QC[13]	1997	Mixed	50	12 (NRTI) 0 (NNRTI)	5	~5	-
	1998		42	0 (NRTI) 6 (NNRTI)	0	0	-
	1999		17	~18 (NRTI) ~13 (NRTI)	~18	~12	-
	2000		18	~12 (NRTI) ~6 (NNRTI)	~6	~5	-
	2001		18	0 (NRTI) 0 (NNRTI)	~6	0	-
	2002		18	0 (NRTI) ~6 (NNRTI)	~6	0	-
	2003		17	0	0	0	-
ON[14]	1997-1999	MSM	23	13	-	-	-
BC, AB, SK, MB, ON, NS[15]	1997	Mixed	38	0	0	0	0
	1998		84	3.4 (NRTI) 0 (NNRTI)	1.1	0	4.5
	1999		280	5.9 (NRTI) 0.3 (NNRTI)	1.6	1.0	8.8
	2000		411	3.9 (NRTI) 0.5 (NNRTI)	1.1	1.1	6.6
	2001		315	4.6 (NRTI) 2.3 (NNRTI)	1.7	1.1	9.7
	2002		145	1.2 (NRTI) 1.9 (NNRTI)	4.4	1.9	9.3
	2003		215	3.3 (NRTI) 2.1 (NNRTI)	4.6	0.8	10.8
	2004		556	3.3 (NRTI) 2.8 (NNRTI)	1.6	1.3	9.0

*BC = British Columbia, QC = Quebec, ON = Ontario, AB = Alberta, SK = Saskatchewan, MB = Manitoba, NS = Nova Scotia

**Reported proportions may not add up to 100% since risk exposure category may not be mutually exclusive.
IDU = injecting drug use, MSM = men who have sex with men

†RTI = reverse transcriptase inhibitor, NRTI = nucleoside reverse transcriptase inhibitor, NNRTI = non-nucleoside reverse transcriptase inhibitor. Information on NRTI and NNRTI provided where available.

Table 2. Summary of key studies on HIV-1 primary drug resistance in the United States and Western Europe

Country	Year of diagnosis	Risk exposures*	Sample size	RTIs** %	PIs† %	MDR‡ %	Total¶ %
United States[4]	1989-1998	MSM (80%)	141	3.5 (NRTI)	10	-	27.6
				17 (NNRTI)			
United States[3]	1995-1999	MSM (94%)	80	12.5 (NRTI)	2.4	3.8	16.3
				7.5 (NNRTI)			
United States[18]	1997-2001	Mixed	1,082	6.4 (NRTI)	1.9	1.3	8.3
				1.7 (NNRTI)			
United States[19]	1998	Mixed	238	3.4 (NRTI)	0	0	3.8
				0.4 (NNRTI)			
	1999		240	8.3 (NRTI)	1.7	1.7	10
				2.1 (NNRTI)			
	2000		245	6.9 (NRTI)	2	1.2	9
				1.2 (NNRTI)			
United States[7]	2003-2004	Mixed	539	7.1 (NRTI)	3.2	3.2	15.2
				9.1 (NNRTI)			
United States (with samples from Canada)[2]	1995-1998	MSM	377	8.5 (NRTI, *n* = 176)	0.9 (*n* = 213)	3.8 (*n* = 213)	8.0 (*n* = 213)
				1.7 (NNRTI, *n* = 176)			
	1999-2000			15.9 (NRTI, *n* = 82)	9.1 (*n* = 88)	10.2 (*n* = 88)	22.7 (*n* = 88)
				7.3 (NNRTI, *n* = 82)			
United States[20]	1996-96	Mixed	40	25 (NRTI)	2.5	2.5	25
				0 (NNRTI)			
United States[21]	-	Youth	55	4.0 (NRTI)	5.5	2	18
				15 (NNRTI)			
Germany[22]	1996-1999	Mixed	64	6.3 (NRTI)	1.6	1.6	12.5
				3.1 (NNRTI)			
France[23]	1995-1998	Mixed	48	16.7	2.1	-	-
France[24]	1999-2000	Mixed	251	7.6 (NRTI)	5.2	4.8	10
				4.0 (NNRTI)			
France[25]	2001-2002	Mixed	666	2.4 (NRTI)	1.2	7.2	11.3
				0.3 (NNRTI)			
France[26]	1999-2000	Male (82%)	249	8 (NRTI)	6	5	10
				4 (NNRTI)			

Table 2. Summary of key studies on HIV-1 primary drug resistance in the United States and in Western Europe *(continued)*

Country	Year of diagnosis	Risk exposures*	Sample size	RTIs** %	PIs† %	MDR‡ %	Total¶ %
France[27]	1996-2004	Male (80%)	518	5.2 (NRTI) 2.5 (NNRTI)	4.4	3.1	8.5
	1998-99		94	7.4 (NRTI) 6.4 (NNRTI)	5.3	1.1	18.1
	2000-2001		91	20.9 (NRTI) 13.2 (NNRTI)	7.7	13.2	27.4
Spain[28]	1996-1998	Mixed		16.2	6	4.4	-
Spain[29]	1997-1999	Mixed (72% MSM)	31	16.1	9.7	0	25.8
	2000-2001		21	0	4.8	0	4.8
Spain[30]	2004	Mixed	182	2.2 (NRTI) 1.1 (NNRTI)	0.5	-	~4
Spain[31]	1997	Mixed	9	33.3 (NRTI) 0 (NNRTI)	0	-	33.3
	1998		17	29.4 (NRTI) 5.9 (NNRTI)	5.9	-	29.4
	1999		5	20 (NRTI) 0 (NNRTI)	0	-	20
	2000		7	0 (NRTI) 0 (NNRTI)	14.3	-	14.3
	2001		30	3.3 (NRTI) 0 (NNRTI)	0	-	3.3
	2002		28	10.7 (NRTI) 3.6 (NNRTI)	3.6	-	14.3
	2003		50	8 (NRTI) 4 (NNRTI)	0	-	10
	2004		52	3.8 (NRTI) 7.7 (NNRTI)	2	-	7.7
	Total		198	9.6 (NRTI) 4.0 (NNRTI)	2	-	12.1
Switzerland[32]	1996	Mixed	193	5.6	3	-	8.6
	1997			6.9	7.7	-	14.6
	1998			6.8	2	-	8.8
	1999			3.1	1.9	-	5
Switzerland[33]	1999-2001	Mixed	200	6.5 (NRTI) 0.5 (NNRTI)	1	1.5	10

Table 2. Summary of key studies on HIV-1 primary drug resistance in the United States and in Western Europe *(continued)*

Country	Year of diagnosis	Risk exposures*	Sample size	RTIs** %	PIs† %	MDR‡ %	Total¶ %
Switzerland[34]	1999-2001	Mixed	220	8.6 (NRTI) 0.9 (NNRTI)	2.3	1.4	10.5
Netherlands[35]	1994-2002	MSM/IDU	100	10 (NRTI) 2 (NNRTI)	1	0	13
United Kingdom[36]	1996-1997	Mixed	310	~7 (NRTI) ~1 (NNRTI)	~1		~8.5
	1998		340	~8 (NRTI) ~2 (NNRTI)	~3		~10
	1999		358	~10 (NRTI) ~5 (NNRTI)	~2.5		~11
	2000		457	~9 (NRTI) ~5 (NNRTI)	~3.5		~14
	2001		516	~9 (NRTI) ~5 (NNRTI)	~4		~13
	2002		520	~11.5 (NRTI) ~6.5 (NNRTI)	~5		~16
	2003		764	~7.5 (NRTI) ~6 (NNRTI)	~3		~12.5
	2004		1,185	~4 (NRTI) ~4 (NNRTI)	~2.5		~9
United Kingdom[37]	2004-2005	Mixed	180	3.3 (NRTI) 2.8 (NNRTI)	1.7	0.6	7.2
Italy[38]	1996-2001	Mixed	112	11.6 (NRTI) 3.6 (NNRTI)	2.7	1.8	16.1
Germany[39]	1999-2003	Mixed	49	12.2 (NRTI) 10.2 (NNRTI)	2	-	20.4
Europe/ Canada[40]	1987-1995	Mixed	69	5.8 (NRTI) 0 (NNRTI)	1.4	-	7.2
	1996-1998		145	11.7 (NRTI) 0.1 (NNRTI)	1.4	-	13.1
	1999-2003		224	11.2 (NRTI) 6.2 (NNRTI)	6.2	-	19.6

14

Table 2. Summary of key studies on HIV-1 primary drug resistance in the United States and in Western Europe *(continued)*

Country	Year of diagnosis	Risk exposures*	Sample size	RTIs** %	PIs† %	MDR‡ %	Total¶ %
Europe[41]	1996-2002	Mixed	2,208	7.6 (NRTI)	2.5	-	10.4
				2.9 (NNRTI)			
Europe[42]	2000-2004	Mixed	698	6.1 (NRTI)	1.8	-	10
				4.0 (NNRTI)			

*MSM = men who have sex with men

**RTI = reverse transcriptase inhibitors, NRTI = nucleoside reverse transcriptase inhibitor, NNRTI = non-nucleoside reverse transcriptase inhibitor. Information on NRTI and NNRTI provided where available.

†PI = protease inhibitors

‡MDR = multi-drug resistance

¶Total may include major and minor mutations associated with primary drug resistance.

Comments

Primary HIV drug resistance has been observed in most countries where HAART is used. Although the interpretation of results is difficult and evolving, persons infected with drug-resistant variants of HIV may be at increased risk of drug failure despite being therapy-naïve. Surveillance of primary drug resistance is needed not only to develop guidelines for initial therapy but also to better understand and prevent the transmission of resistant HIV.

References

1. Richman D, Morton SC, Terri W et al. *The prevalence of antiretroviral drug resistance in the United States*. AIDS 2004;18(10):1393-1401.

2. Little SJ, Holte S, Routy JP et al. *Antiretroviral drug resistance among patients recently infected with HIV*. N Engl J Med 2002;347: 385-94.

3. Boden D, Hurley A, Zhang L et al. *HIV-1 drug resistance in newly infected individuals*. JAMA 1999;282:135-41.

4. Little SJ, Daar ES, D'Aquila RT et al. *Reduced antiretroviral drug susceptibility among patients with primary HIV infection*. JAMA 1999;282:1142-49.

5. Brodine SK, Shaffer RA, Starkey MJ et al. *Drug resistance patterns, genetic subtypes, clinical features, and risk factors in military personnel with HIV-1 seroconversion*. Ann Intern Med 1999;131:502-6.

6. Yerly S, Kaiser L, Race E et al. *Transmission of anti-retroviral drug resistant HIV-1 variants*. Lancet 1999;354:729-33.

7. Bennett D, McCormick L, Kline R et al. *US surveillance of HIV drug resistance at diagnosis using HIV diagnostic sera*. Twelfth Conference on Retroviruses and Opportunistic Infections, Boston, MA, Feb 22-25, 2005; #674.

8. Kantor R, Katzenstein D. *Drug resistance in non-subtype B HIV-1*. J Clin Virol 2004; 29:152-59.

9. Wainberg MA. *HIV-1 subtype distribution and the problem of drug resistance*. AIDS 2004;18(suppl3):S63-8.

10. Erice A, Mayers DL, Strike DG et al. *Primary infection with zidovudine-resistant human immuno-deficiency virus type 1*. N Engl J Med 1993;328:163-65.

11. Brumme ZL, Chan KJ, Dong WW et al. *Prevalence and clinical implications of insertions in the HIV-1 p6Gag N-terminal region in drug-naïve individuals initiating antiretroviral therapy*. Antivir Ther 2003;8:91-6.

12. Salomon H, Wainberg MA, Brenner B et al. *Prevalence of HIV-1 viruses resistant to*

antiretroviral drugs in 81 individuals newly infected by sexual contact or intravenous drug use. AIDS 2000;14(2):F17-23.

13. Routy JP, Machouf N, Edwardes MD et al. *Factors associated with a decrease in the prevalence of drug resistance in newly HIV-1 infected individuals in Montreal.* AIDS 2004; 18(17):2305-12.

14. Cassol S, Calzavara L, Major C et al. *HIV-1 drug resistance in Ontario seroconverters.* Ninth Annual Canadian Conference on HIV/ AIDS Research, Montreal, QC, April 27-30, 2000; #135P.

15. Public Health Agency of Canada. *HIV-1 strain and primary drug resistance in Canada: surveillance report to March 31, 2005.* Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control, Public Health Agency of Canada, 2006.

16. Johnson V, Petropoulos CJ, Woods CR et al. *Vertical transmission of multidrug-resistant human immunodeficiency virus type 1 (HIV-1) and continued evolution of drug resistance in an HIV-1-infected infant.* J Infect Dis 2001;183:1688-93.

17. Masquelier B, Chaix ML, Burgard M et al. *Zidovudine genotypic resistance in HIV-1-infected newborns in the French perinatal cohort.* J Acquir Immune Defic Syndr 2001;27:99-104.

18. Bennett DE, Zaidi IF, Heneine W et al. *Prevalence of mutations associated with antiretroviral drug resistance among men and women newly diagnosed with HIV in 10 US cities, 1997-2001* [Abstract]. Antivir Ther 2003;8:S133.

19. Bennett D, Zaidi I, Heneine W et al. *Prevalence of mutations associated with antiretroviral drug resistance among recently diagnosed persons with HIV, 1998-2000.* Ninth Conference on Retroviruses and Opportunistic Infections, Seattle, WA, Feb 24-28 2002; #95.

20. Grant R, Hecht F, Warmerdam M et al. *Time trends in primary HIV-1 drug resistance among recently infected persons.* JAMA 2002;288(2):181-88.

21. Viani R, Peralta L, Aldrovandi G et al. *Prevalence of primary HIV drug resistance among recently infected adolescents: a Multicenter Adolescent Trials Network study: ATN029.* Thirteenth Conference on Retroviruses and Opportunistic Infections, Denver, CO, Feb 6-8, 2006;#21.

22. Duwe S, Brunn M, Altmann D et al. *Frequency of genotypic and phenotypic drug-resistant HIV-1 among therapy-naïve patients of the German Seroconverter Study.* J Acquir Immune Defic Syndr 2001;26:266-73.

23. Tamalet C, Pasquier C, Yahi N et al. *Prevalence of drug resistant mutants and virological response to combination therapy in patients with primary HIV-1 infection.* J Med Virol 2000;61:181-86.

24. Chaix M-L, Descamps D, Deveau C et al. *Antiretroviral resistance, molecular epidemiology and response to initial therapy among patients with HIV-1 primary infection in 1999-2000 in France.* Antivir Ther 2002;7:S138.

25. Descamps D, Chaix M-L, André P et al. *French national sentinel survey of antiretroviral drug resistance in patients with HIV-1 primary infection and in antiretroviral-naïve chronically infected patients in 2001-2002.* Clin Sci 2005;38(5):545-52.

26. Chaix M-L, Descamps D, Harzic M et al. *Stable prevalence of genotypic drug resistance mutations but increase in non-B virus among patients with primary HIV-1 infection in France.* AIDS 2003;7:2635-43.

27. Ghosn J, Pellegrin I, Goujard C et al. *HIV-1 resistant strains acquired at the time of primary infection massively fuel the cellular reservoir and persist for lengthy periods of time.* AIDS 2006;20:159-70.

28. Puig T, Perez-Olmeda M, Rubio A et al. *Prevalence of genotypic resistance to nucleoside analogues and protease inhibitors in Spain. The ERASE-2 Study Group.* AIDS 2000;14: 727-32.

29. de Mendoza C, del Romero J, Rodriguez C et al. *Decline in the rate of genotypic resistance to antiretroviral drugs in recent HIV seroconverters in Spain.* Ninth Conference on Retroviruses and Opportunistic Infections, Seattle, WA, Feb 24-28, 2002;371-M.

30. Martinez-Picado J, Gutiérrez C, de Mendoza C et al. *Surveillance of drug resistance and HIV*

subtypes in newly diagnosed patients in Spain during 2004. Antivir Ther 2005;10:S137.

31. de Mendoza C, Rodriguez C, Colomina J et al. *Resistance to nonnucleoside reverse transcriptase inhibitors and prevalence of HIV type 1 non-B subtypes are increasing among persons with recent infection in Spain.* Clin Infect Dis 2005;41:1350-54.
32. Yerly S, Vora S, Rizzardi P et al. *Acute HIV infection: impact on the spread of HIV and transmission of drug resistance*. AIDS 2001;15:2287-92.
33. Yerly S, Jost S, Telenti A et al. *Transmission of drug resistance: impact of primary and chronic HIV infection. XI International HIV Drug Resistance Workshop, Seville, Spain, July 2-5, 2002.* Antiviral Ther 2002;7(Suppl 1):#183.
34. Yerly S, Jost S, Telenti A et al. *Infrequent transmission of HIV-1 drug-resistant variants*. Antivir Ther 2004;9:375-84.
35. Bezemer D, Jurriaans S, Prins M et al. *Declining trend in transmission of drug-resistant HIV-1 in Amsterdam*. AIDS 2004;18:1571-77.
36. UK HIV Drug Resistance Database. *HIV drug resistance in the United Kingdom: data to end of 2004*. CDR Wkly 2006;16(4).
37. Geretti A, Booth C, Labbett W et al. *Risk group predicts the prevalence of primary resistance amongst newly diagnosed HIV-infected patients presenting with established infection according to the STARHS algorithm.* Antivir Ther 2005;10:S131.
38. Violin M, Velleca R, Cozzi-Lepri A et al. *Prevalence of HIV-1 primary drug resistance in seroconverters of the ICoNA cohort over the period 1996-2001*. J Acquir Immune Defic Syndr 2004;36(2):761-63.
39. Metzner K, Rauch P, Walter H et al. *Detection of minor populations of drug-resistant HIV-1 in acute seroconverters*. Antivir Ther 2005;10:S123.
40. Masquelier B, Bhaskaran K, Pillay D et al. *Prevalence of transmitted HIV-1 drug resistance and the role of resistance algorithms*. J Acquir Immune Defic Syndr 2005;40(5):505-11.
41. Wensing A, van de Vijver D, Angarano G et al. *Prevalence of drug-resistant HIV-1 variants in untreated individuals in Europe: implications for clinical management*. J Infect Dis 2005;192:958-66.
42. van de Vijver D, Wensing A, Åsjö B et al. *Selective transmission of drug resistance mutations.* Antivir Ther 2005;10:S126.

Acknowledgements

National level HIV and AIDS surveillance is possible as a result of all provinces and territories participating in, and setting directions for, HIV and AIDS surveillance. CIDPC acknowledges the provincial/territorial HIV/AIDS coordinators, public health units, laboratories, health care providers, and reporting physicians for sharing non-nominal, confidential data for national surveillance.

For more information, please contact:

Surveillance and Risk Assessment Division
Centre for Infectious Disease Prevention and Control
Public Health Agency of Canada
Tunney's Pasture
Postal locator: 0602B
Ottawa, ON K1A 0K9
Tel: (613) 954-5169
Fax: (613) 957-2842
www.phac-aspc.gc.ca

Mission

To promote and protect the health of Canadians through leadership, partnership, innovation and action in public health.

Public Health Agency of Canada

GLOSSARY

A *Guide to HIV/AIDS Epidemiological and Surveillance Terms* is available. The guide contains over 65 terms and over 20 frequently asked questions, and is accessible http://www.phac-aspc.gc.ca/publicat/haest-tesvs/index.html. Hard copies may be obtained through the Surveillance and Risk Assessment Division, for which the address is listed under the 'Information to Readers of HIV/AIDS Epi Updates' section. A selected number of acronyms and terms that may be useful when reading *HIV/AIDS Epi Updates* are listed below.

ACRONYMS

AIDS	→ Acquired Immunodeficiency Syndrome
HIV	→ Human Immunodeficiency Virus
IDU	→ Injecting Drug Users
MSM	→ Men who have Sex with Men
NEP	→ Needle Exchange Program
WHO	→ World Health Organization

TERMS

Cohort Study – The purpose of a cohort study is to investigate the development of new occurrences of a disease or to investigate how responses to treatment are related to specific factors. These factors can be recorded at the beginning of the study and/or during the course of the study.

A cohort study starts with a group of people who will be participants in the study. This group of people is called a cohort.

The cohort is followed for a specified time period, which can be weeks, months, years or decades. Follow up data are collected at regularly defined periods either through the use of questionnaires, personal interviews, laboratory testing, medical examinations, or a combination of these methods.

A cohort study is sometimes referred to as a prospective or longitudinal study.

Co-Infection – having two infections at the same time. For example, a person infected with both HIV and hepatitis C (HCV), or HIV and tuberculosis (TB), has a co-infection. With co-infections the progression of either disease can potentially be accelerated as a result of infection with the other disease.

Exposure Category – In HIV and AIDS surveillance, exposure category refers to the most likely way a person became infected with the HIV virus, that is, the most likely route through which HIV was transmitted to that person.

Incidence - Incidence is the number of *new* events of a specific disease during a specified period of time in a specified population. HIV incidence is the number of *new* HIV infections occurring in a specified period of time in a specified population.

Methodology – The methodology section of a report or research study describes how the study was conducted (the methods) and the principles used by study investigators. These methods include how participants were recruited, and how the data were collected, organized and analyzed.

Notifiable Disease – a disease that is considered to be of such importance to public health that its occurrence is required to be reported to public health authorities.

Perinatal Transmission: The transmission of HIV from an HIV-infected mother to her child either *in utero,* during childbirth, or through breastfeeding.

Person Years – Person years describes the length of time of experience or exposure of a group of people who have been observed for varying periods of time. It is the sum total of the length of time each person has been exposed, observed or at risk. You will sometimes see person years reported as PY or py. Person years is often used as the denominator in expressing incidence rate.

Population at Risk – The population at risk represents those persons at risk of contracting a disease.

Prevalence – Prevalence is the total number of people with a specific disease or health condition living in a defined population at a particular time. HIV prevalence among Canadians is the total number of people living with HIV infection (including those with AIDS) in Canada at a particular time.

Rate – A rate is an expression of the frequency with which an event occurs in a defined population in a specified period of time. In HIV/AIDS research, a rate can be the proportion of a population with a particular "event", such as HIV infection, occurring during a specified time period.

Risk Factor – is an aspect of someone's behaviour or lifestyle, a characteristic that a person was born with, or an event that he or she has been exposed to, that is known to be associated with a health-related condition. A *behavioural* risk factor describes a specific behaviour that carries a proven risk of a particular outcome. In HIV/AIDS research, you will often see the term 'HIV-related risk behaviour' to describe a behaviour that, when practised, carries a proven risk of HIV infection.

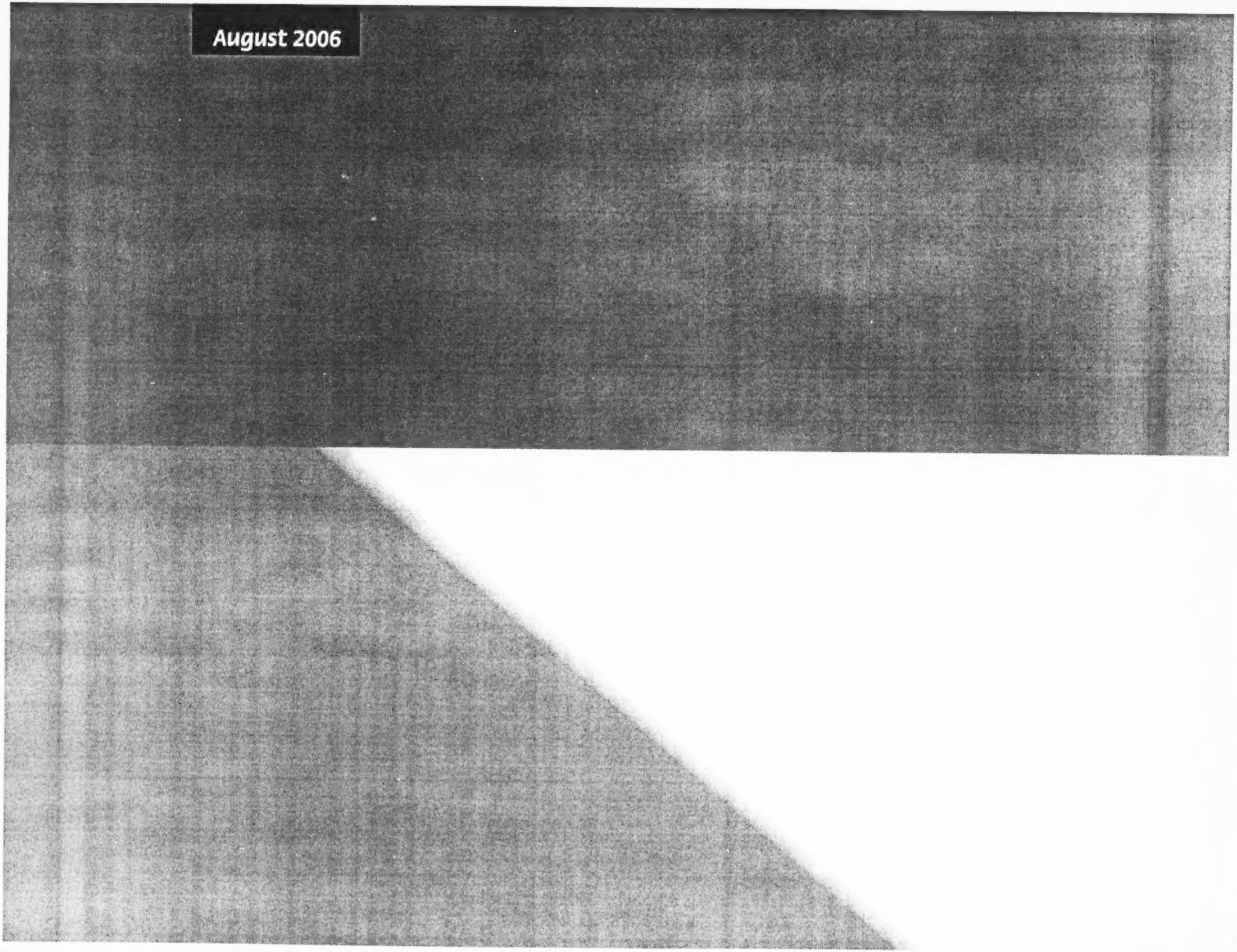
Self-Reported Data – In research studies, self-reported data is a term applied to information that is directly reported by the study participants.

Sentinel Surveillance – is a type of surveillance activity in which specific facilities such as offices of certain health care providers, hospitals or clinics across a geographical region are designated to collect data about a disease, such as HIV infection. These data are reported to a central database for analysis and interpretation.

Seroconversion – The root "sero" means the serum of the watery portion of blood. In HIV/AIDS research, seroconversion refers to the development of detectable antibodies to HIV in the blood as a result of HIV infection. A person who goes from being HIV negative to HIV positive is said to have seroconverted or is a seroconverter.

Seroprevalence – the terms refers to the prevalence or prevalence rate of a disease determined by testing blood rather than saliva, urine, or sputum.

Surveillance – is the ongoing collection, analysis and interpretation of data about a disease such as HIV or about a health condition. The objective of surveillance is to assess the health status of populations, detect changes in disease trends or changes in how the disease is distributed, define priorities, assist in the prevention and control of the disease, and monitor and evaluate related treatment and prevention programs.


August 2006